COLOR CONTROLLER

COMPUTER
IMAGE
CORPORATION

ALTEMUS

COLORIZER
(OBS.) SYSTEM #4 (SCANIMATE)

BILL ALTEMUS

COLOR CONTROLLER

COMPUTER
IMAGE
CORPORATION

ALTEMUS

COLORIZER
(OBS.) SYSTEM #4 (SCANIMATE)

COLORIZER

Introduction

The purpose of the Colorizer is to produce a color representation using the standard NTSC television format of a static or dynamic scene produced on a CRT controlled by a Scanimate or some other similar device. Each color is independently selective and variable. Signals are generated for representing the scene in descrete shades of gray, which signals are used to generate further signals representing the red, green, and blue components of a color assigned to each gray shade. The system further includes means for selecting the colors assigned to the various gray shades, and exclusive logic means allowing independent selection and variation of each color by an operator.

COLOR ~~ENCODER~~ CONTROLLER

Sync Timing CVS - 102A

This card furnishes the timing pulses for X-Y scan converter camera and blanking pulses for the other cards in the color encoder electronics nest. The inputs to this card are the Vertical and Horizontal Drive pulses and composite blanking from the Type 140 NTSC Test Generator. The horiz drive pulse is delayed by 1.5 μ sec and this pulse goes to two one-shots. One one-shot forms the horizontal reset pulse for the X-Y camera and the other one-shot forms the horizontal portion of the composite ~~clamp~~ camera blanking. The Vertical drive pulse is delayed .2 m. sec and this pulse also goes to two other one-shots. One one-shot forms the Vertical Reset pulse and the other forms the vertical portion of the composite ~~clamp waveform.~~ camera blanking. The vertical and horizontal portions of the ~~clamp waveform~~ camera blanking are combined in an OR circuit to form what is called the Composite ~~Clamp~~. Camera Blanking.

The Composite Blanking, like the Vertical and Horizontal drive pulses, comes from the Type 140 NTSC Test Generator as a 0V to negative voltage waveform. The level of all three are shifted to a 0V to positive voltage so they can be used by the other circuits.

Level Detector CVS - 103B

Video from the scan converter camera comes into the board at the Video Input. This signal is clamped to ground by Q1 during blanking and fed to the non-inverting input of the four comparators (IC1 thru IC4). The inverting input of each comparator connects to a slider pot on the front panel (level adjust pots). These pots adjust the comparison point. As the video level increases the comparators change state and gate on or off the output levels. Only one output level is on at any one time. The positive level is off and the zero level is on. Composite blanking is used to gate off the first level during blanking. At that time all five output lines are positive.

Also on this board is an amplifier for inverting the correction signal. This inverted signal goes to one side of the level adjust slider pots on the front panel. The output of this amplifier is set at +1V nominal by R16 Corr. Level. The other pot, R15 Corr. Gain, adjusts the amount of correction signal to be added to the level adjust controls.

Color Switches CVS - 101B

Coming from the Level Detectors are 5 signal lines. Only one line will be active at any one time. Each of these inputs control the bases of three transistors used for adjusting the amount of color (R, B, G) to be gated to the output. The gain of each transistor is controlled by an external color control slider pot on the front panel. This pot is connected to the emitter of the transistor through a 2.4K resistor. This will give a 1V signal at the output for maximum gain and OV for minimum gain.

Color Matrix CVS - 100~~B~~D

This board is added to the Type 140 NTSC Test Generator to convert the R, B, G, video information from the color switches to Y, R-Y, and B-Y signals. These signals make up the composite video out of the NTSC Test Generator.

Coming into this board are the Red, Green, and Blue signals from the color switches. The signals are clamped and resistively added by R36, R37, and R61 to make up the Y signal. This signal is amplified by Q12 and Q13 differential pair to make the Y and -Y signals. The Y signal is fed to output transistors Q38 and Q39 and goes to the Video Mixer. The -Y signal is added to the red by R62 and R63 to make up R-Y and to the blue by R89 and R90 to make up B-Y. These signals are amplified by differential pairs Q19 and Q20, (R-Y), and Q29 and Q30, (B-Y), to form the ±(R-Y) and ±(B-Y) signals which are fed to the current amplifiers (Q21 thru Q24 and Q31 thru Q34).

Coming from the Video Mixer is a modified Y signal which is delayed and fed to an operational amplifier (Q35 thru Q37) which drives the current amplifier (Q15 and Q16).

Blanking is used to gate on and off the current amplifiers (Q15, Q16, Q23, Q24, Q33, Q34) that are the output stages of this card. A switch, S1, can also inhibit Y, R-Y and B-Y signals from being processed by the NTSC Test Generator.

For the following adjustments the Composite Video out of the Type 140 NTSC Test Generator can be observed on a Type 528 waveform monitor. The input test signal should be black and white only:

CCW - B long
CW B short

→ B-Y Lev - gain (stays centered)

B-Y Gain - gain (B (position moves more)

B-Y Bal position of all

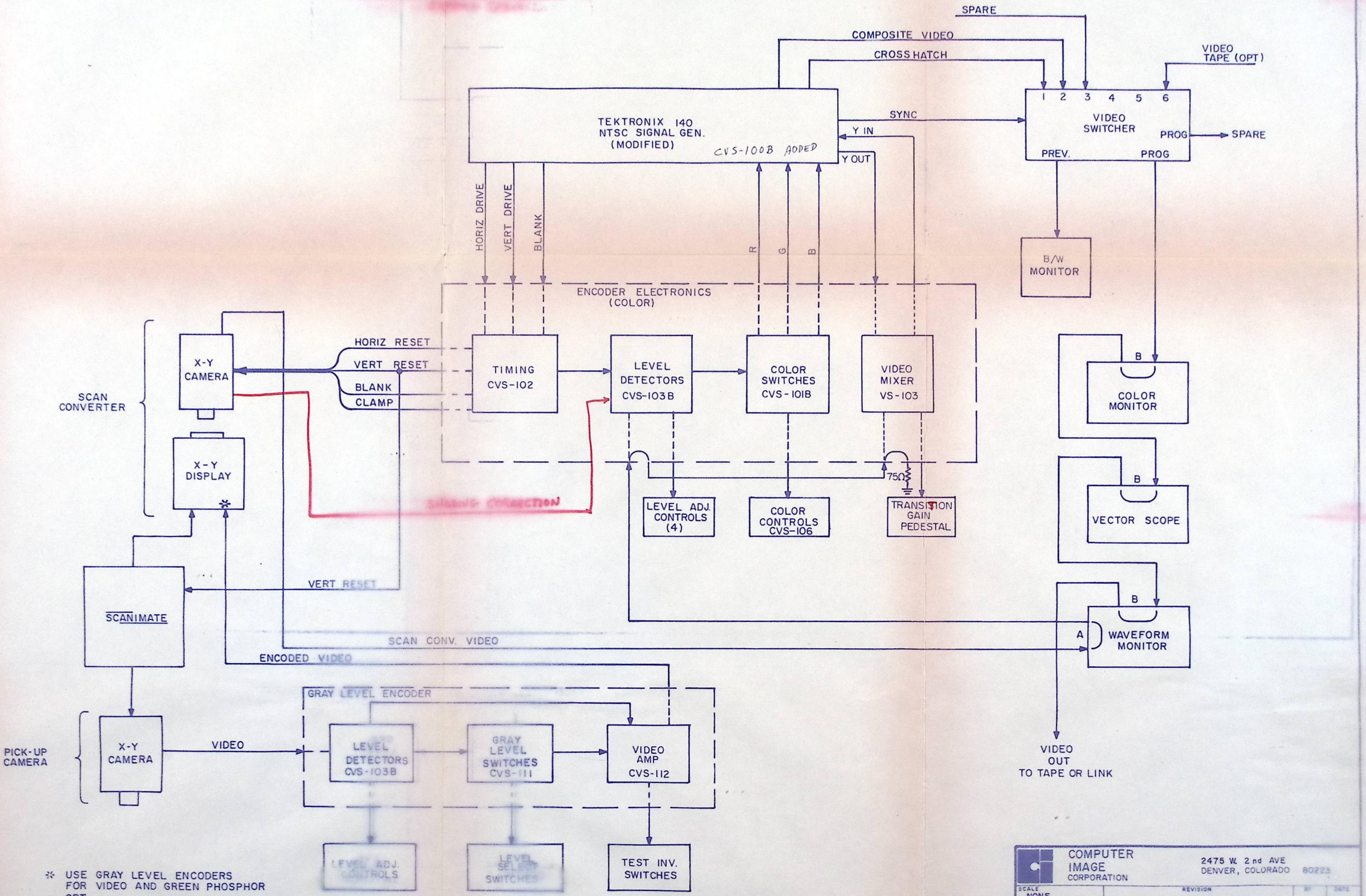
R38	Y-C Bal	Adjust for black + white points to ~~be~~ coincide on Vectorscope ~~adjust for null at R-Y and B-Y test point of the white level.~~
Adju R51	Y Gain	adjust for 100% of white level. with gain control of video mixer fully cw.
R116	Pedestal	adjust for a black level of 0% with pedestal control of video mixer fully ccw. These two controls interact.

The following adjustments can be observed on a Type 520 NTSC Vector Scope. The input test signal should be 5 colors White, Red, Green, Blue, and Black. There will be interaction between the following adjustments. The objective is to get the red and blue vectors in the boxes designated R and B with the origin centered on the vector scope. If these adjustments are properly made the green vector will fall in its designated box:

R64	R-Y Gain	affects length of red vector
R72	R-Y Bal	affects zero position (B+W) of vectors in R-Y direction,
R70	R-Y Level	~~affects angle of blue vector. Set at midrange for initial adjustment.~~ Adjust for linear operation of Q21+22. Emitters should be +1.2V for B+W.
R92	B-Y Gain	affects length of blue vector
R100	B-Y Bal	affects zero position (B+W) of vectors in B-Y direction.
R98	B-Y Level	~~affects angle of red vector. Set at midrange for initial adjustment.~~ Adjust for linear operation of Q31 and Q32. Emitters should be +1.2V for black and white.

Mix - EFF Amplifier VS - 103

~~Not all of this board is used in this application and extra pins have been added.~~ Coming in on the A and B inputs are Video signal from the camera which is delayed at the input to the card and the Y signal from the Color Matrix board (CVS-100B). These two signals are clamped and fed to differential amplifiers Q21 and Q22 that are connected so that they act as mixers. The mix control of the differential amplifiers comes from the dual Transition pot on the front panel. As the transition control is turned CCW the voltage at G1 of Q21 decreases and the voltage at G2 of Q22 increases. Decreasing the gain of the G1 side of Q21 causes the G2 side to conduct more and therefore increase the amount of signal in R66 supplied by the current source Q20. Increasing the gain of the G2 side of Q22 causes the G1 side to conduct less and therefore decrease the amount of signal in R66 supplied by the current source Q23. This mixed signal is clamped by Q27 and coupled to a clipper circuit Q30 which clips the white level to a point set by R92 White Clip. The signal is then amplified and the offset or pedestal added. The offset control R93 is not on the card. The wiper of the Pedestal control on front panel takes the place of the offset wiper. The output goes back to the color matrix board as the new Y signal.

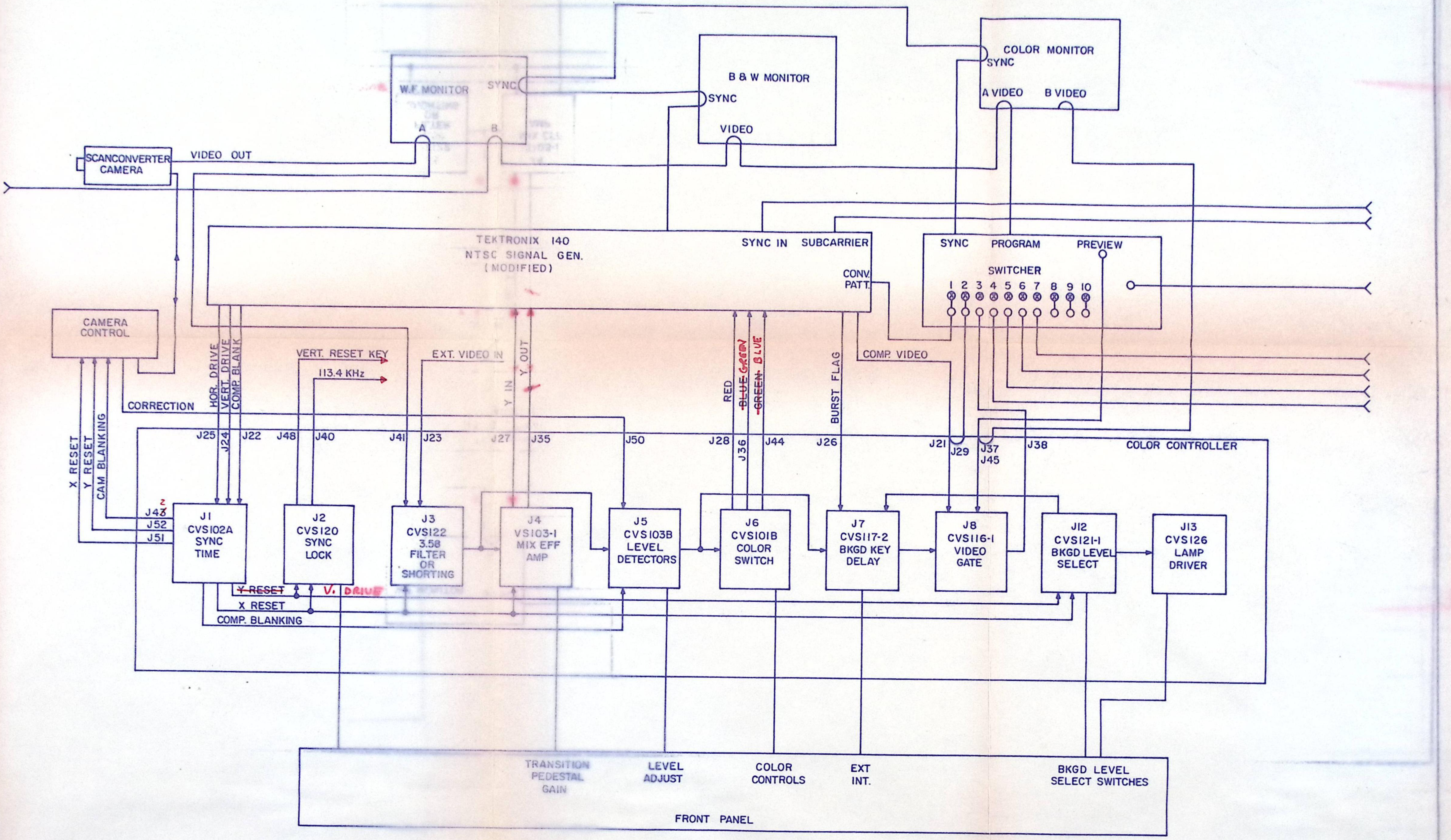


* USE GRAY LEVEL ENCODERS FOR VIDEO AND GREEN PHOSPHOR CRT.

COMPUTER
IMAGE
CORPORATION
2475 W. 2nd AVE
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY / DATE
DATE 2-20-71		
DR'N E.R.	CK'D. SD	
AP'VD.		

TITLE
BLOCK DIAGRAM COLOR VIDEO SYSTEM
NO



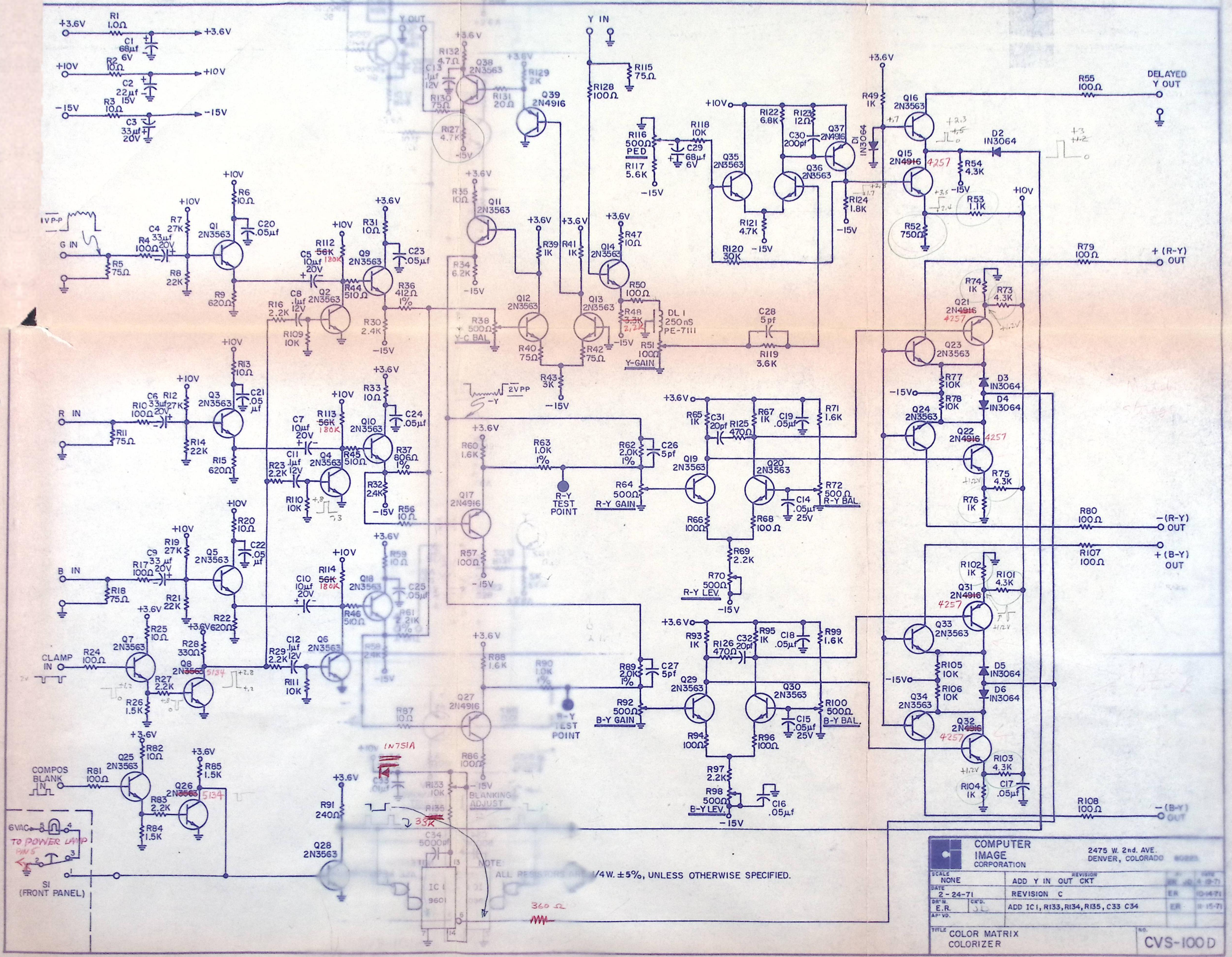
COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE
REVISION
DATE 11-8-72
DR'N. Mack
CK'D.
AP'VD.

TITLE COLORIZER BLOCK DIAGRAM

NO. CVSW-B-100



NOTE: ALL RESISTORS ARE 1/4W. ±5%, UNLESS OTHERWISE SPECIFIED.

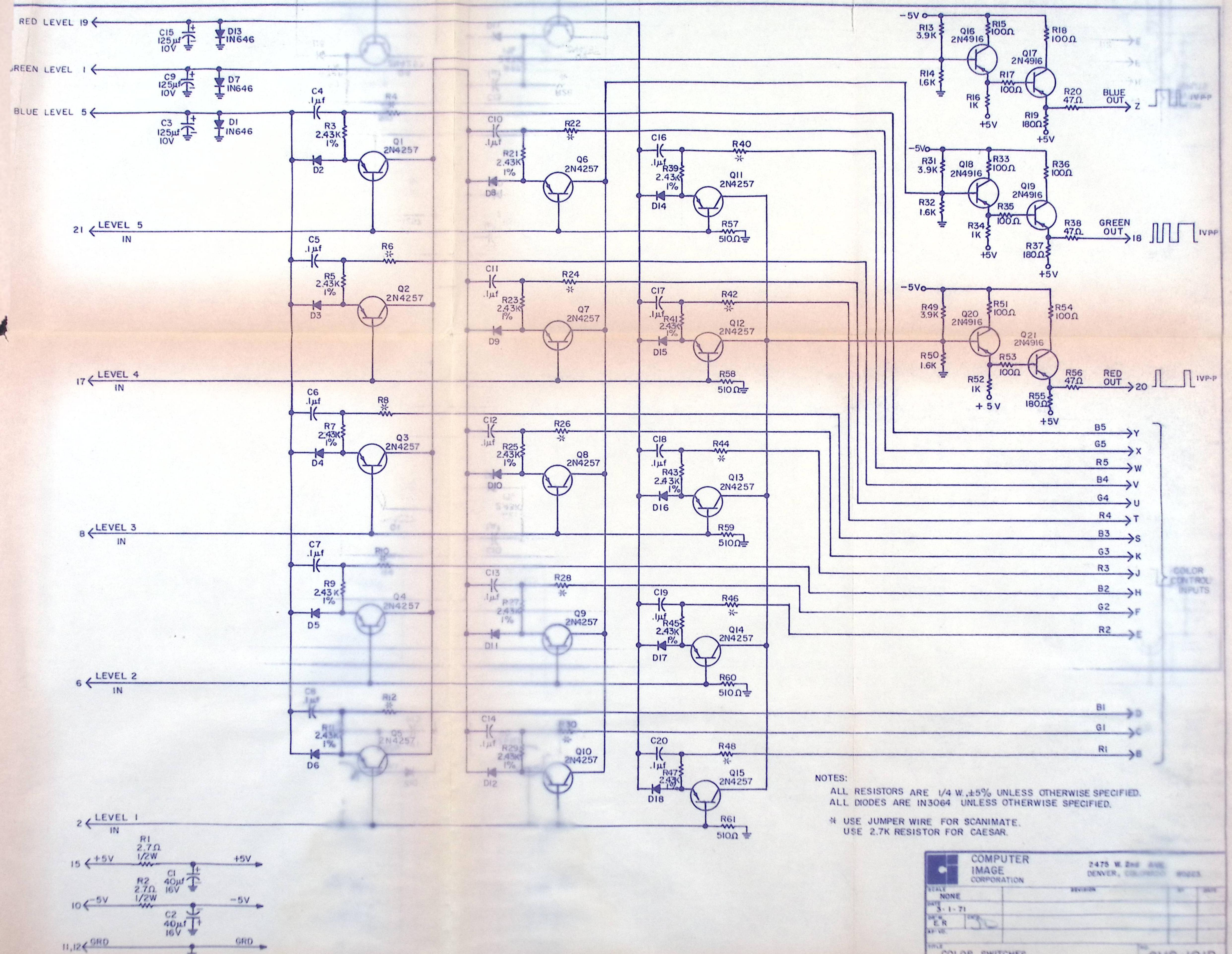
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd. AVE.
DENVER, COLORADO 80223

SCALE		REVISION	BY	DATE
NONE		ADD Y IN OUT CKT	ER JD	4-19-71
DATE 2-24-71		REVISION C	ER	10-14-71
DR'N. E.R.	CK'D. JD	ADD IC1, R133, R134, R135, C33 C34	ER	11-15-71
AP'VD.				

TITLE COLOR MATRIX
COLORIZER

NO. CVS-100D



NOTES:

ALL RESISTORS ARE 1/4 W.,±5% UNLESS OTHERWISE SPECIFIED.
ALL DIODES ARE IN3064 UNLESS OTHERWISE SPECIFIED.

* USE JUMPER WIRE FOR SCANIMATE.
USE 2.7K RESISTOR FOR CAESAR.

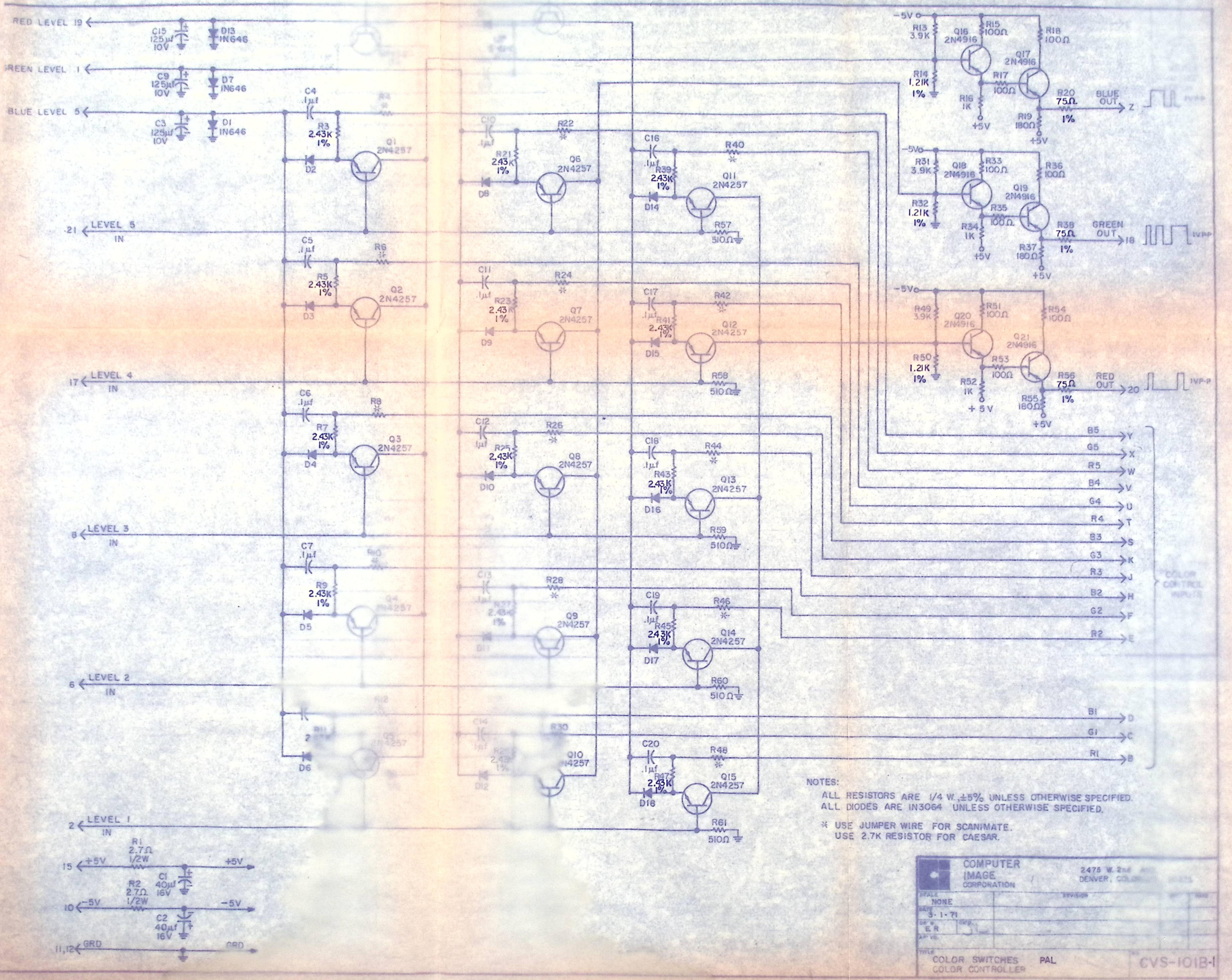
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 3-1-71			
DR'N E.R. / CK'D			
AP'VD.			

TITLE COLOR SWITCHES
COLOR CONTROLLER

NO. CVS-101B



NOTES:
ALL RESISTORS ARE 1/4 W. ±5% UNLESS OTHERWISE SPECIFIED.
ALL DIODES ARE IN3064 UNLESS OTHERWISE SPECIFIED.

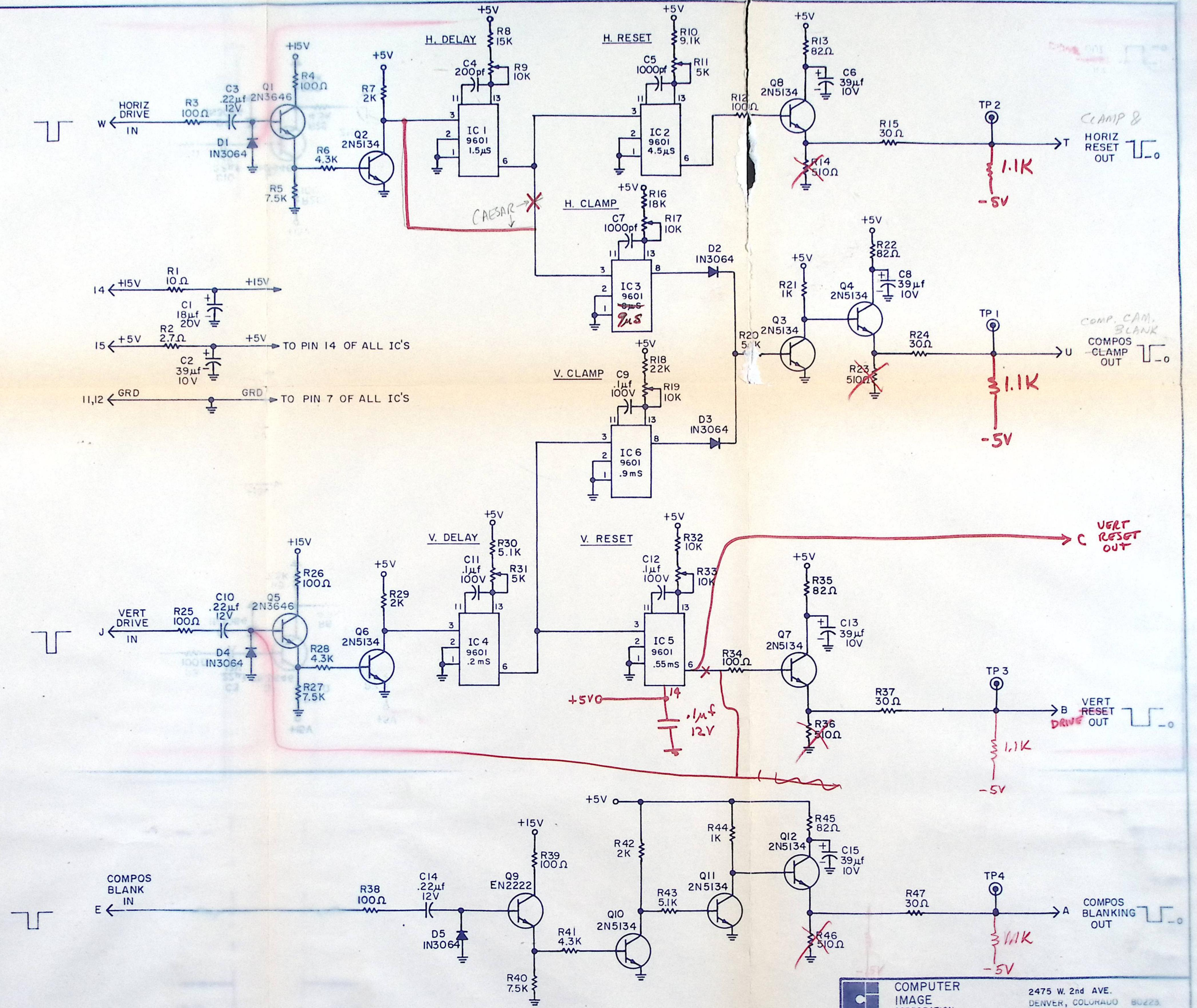
* USE JUMPER WIRE FOR SCANIMATE.
USE 2.7K RESISTOR FOR CAESAR.

COMPUTER IMAGE CORPORATION
2475 W. 2nd [illegible]
DENVER, COLO[illegible]

SCALE NONE	REVISION	BY	DATE
DATE 3-1-71			
DR'N E R	CKD.		
APP'VD.			

TITLE COLOR SWITCHES PAL
COLOR CONTROLLER

NO. CVS-101B-1



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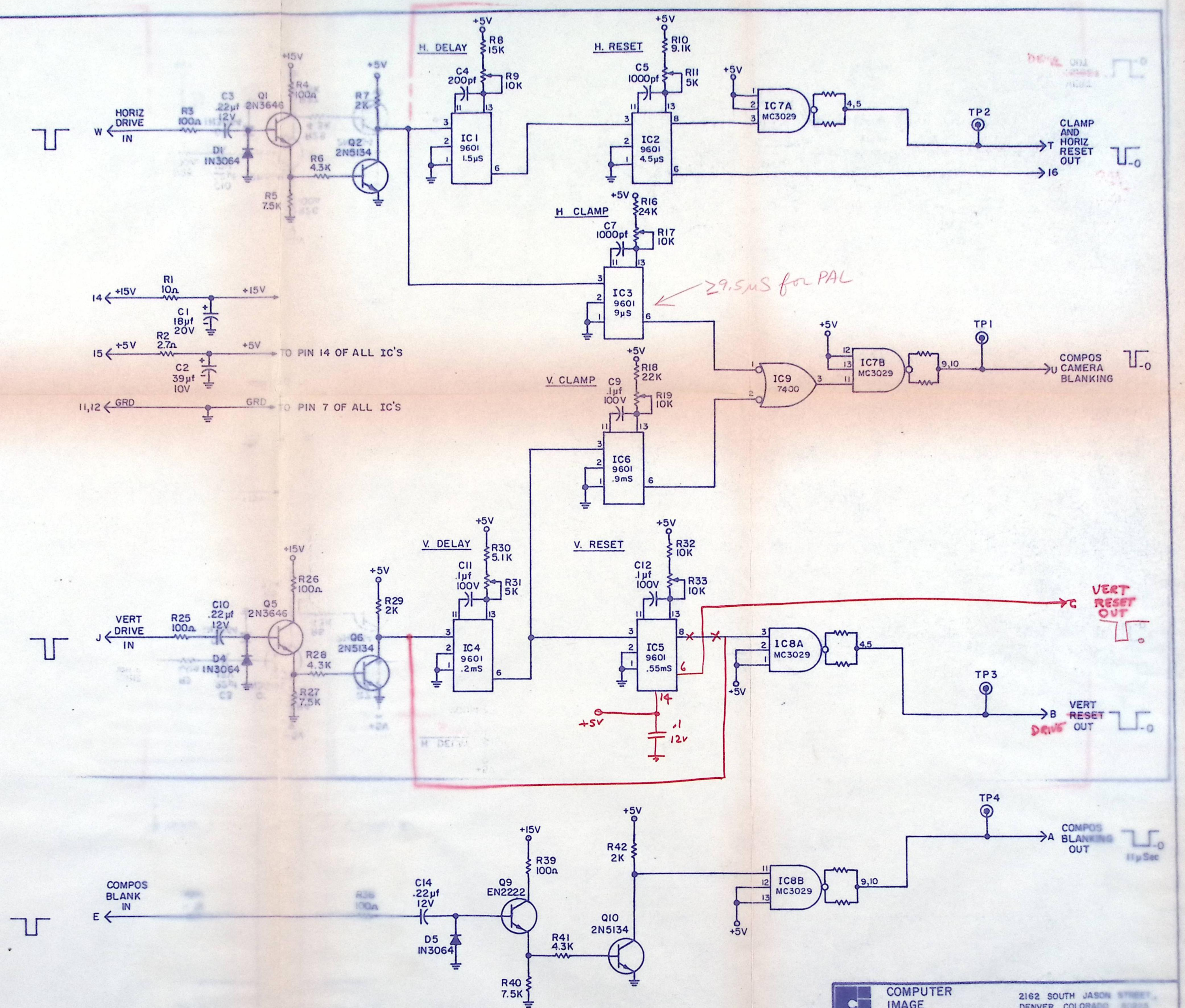
2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 2-26-71			
DR'N. E.R.	CK'D. JD		
AP'VD.			
TITLE SYNC TIMING (COLORIZER)		NO. CVS-102	



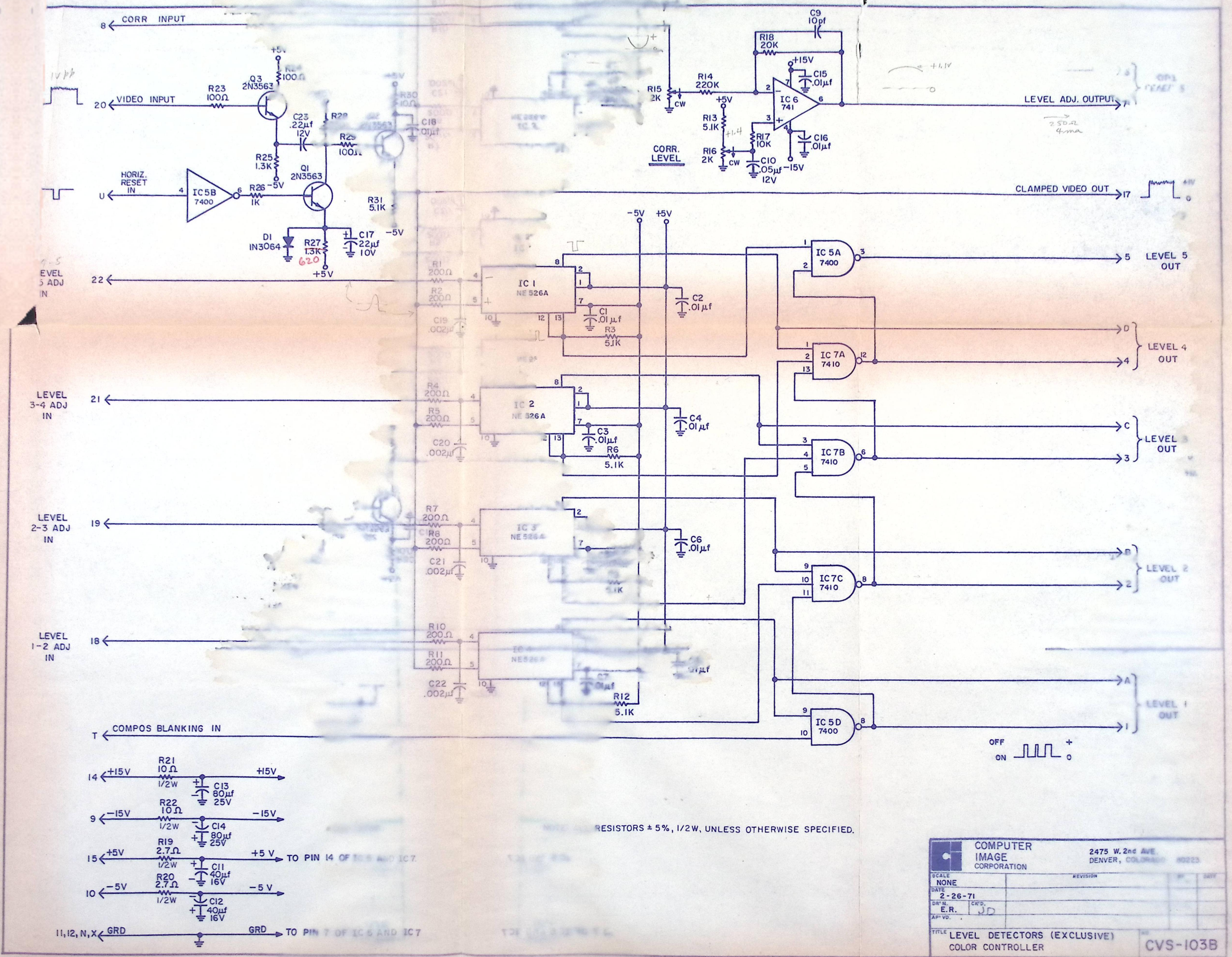
NOTE: ALL RESISTORS ARE 1/4 W UNLESS OTHERWISE SPECIFIED.
MC3029, GRD PIN 7

COMPUTER IMAGE CORPORATION
2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE NONE	REVISION REDRAW WITH CHANGES		9-12-72
DATE 2-26-71			
DR'N. E.R. CK'D.			
AP'VD.			

TITLE SYNC TIMING
COLOR CONTROL

NO. CVS-102 A



RESISTORS ± 5%, 1/2W, UNLESS OTHERWISE SPECIFIED.

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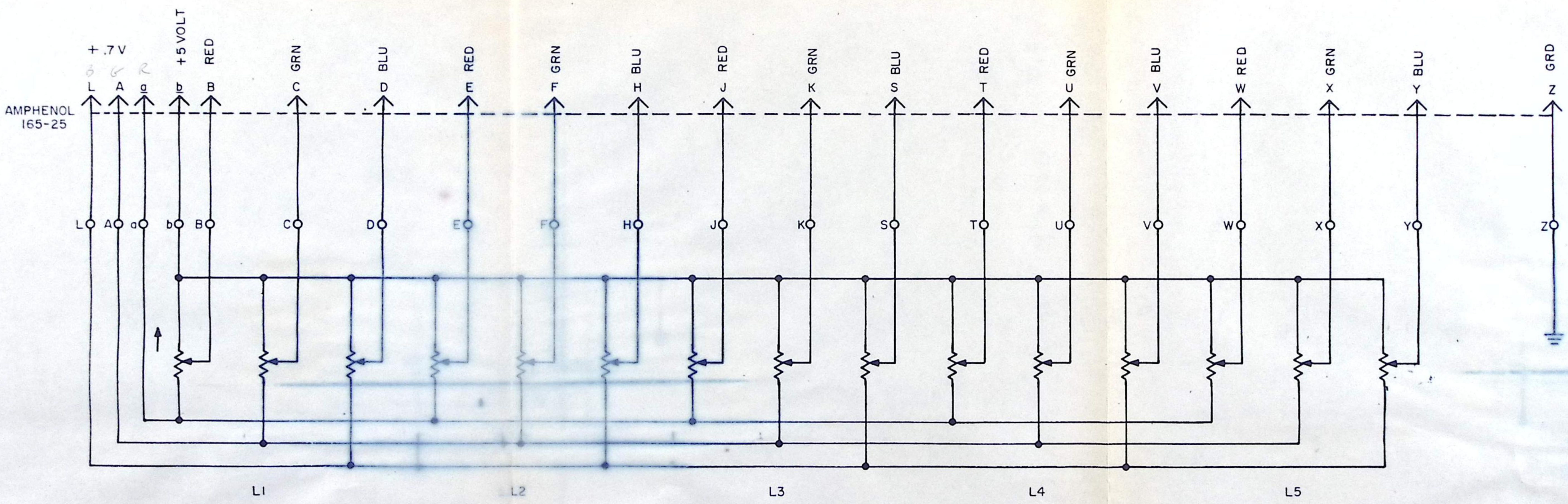
2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE	NONE
DATE	2-26-71
DR'N.	E.R.
CK'D.	JD
AP'VD.	
REVISION	

TITLE LEVEL DETECTORS (EXCLUSIVE)
COLOR CONTROLLER

CVS-103B



ALL POTS 1K LINEAR CTS-480

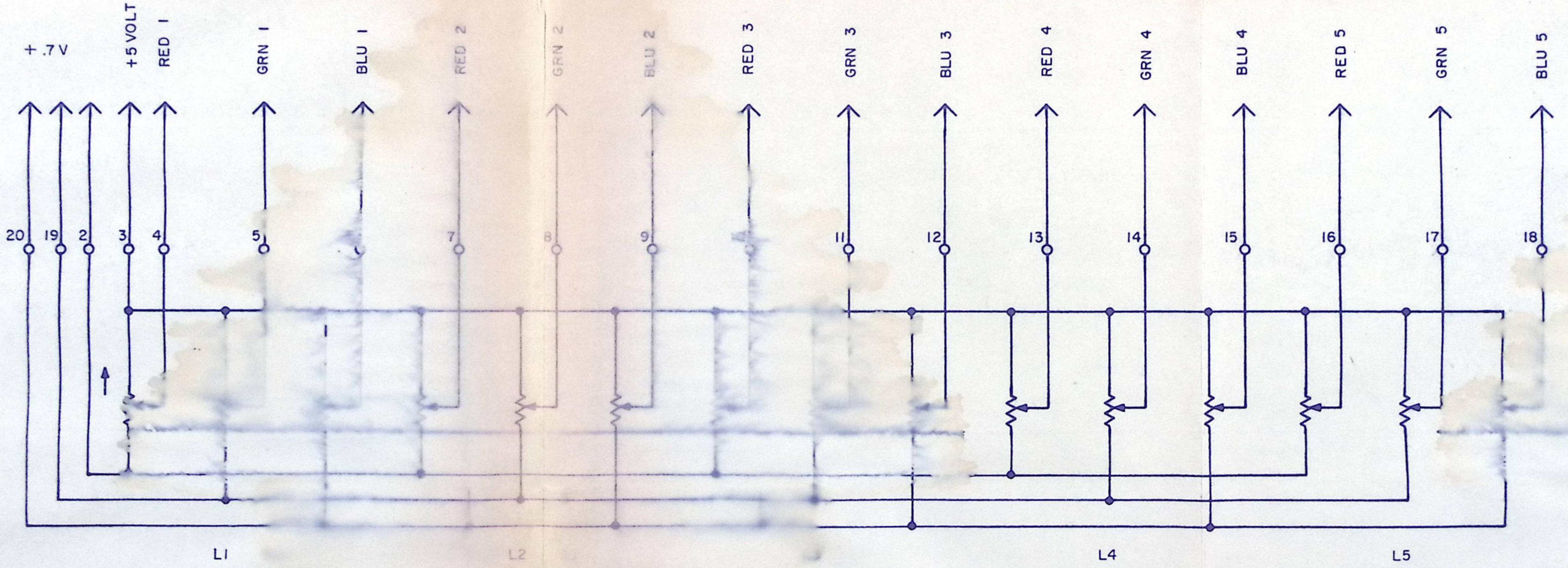
COMPUTER IMAGE CORPORATION

2475 W. 2nd. AVE.
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 3-11-71			
DR'N. E.R. CK'D. JD			
AP'VD.			

TITLE COLOR CONTROLS
(COLOR VIDEO SYSTEM)

NO. CVS-106



ALL POTS 1K LINEAR CTS-480

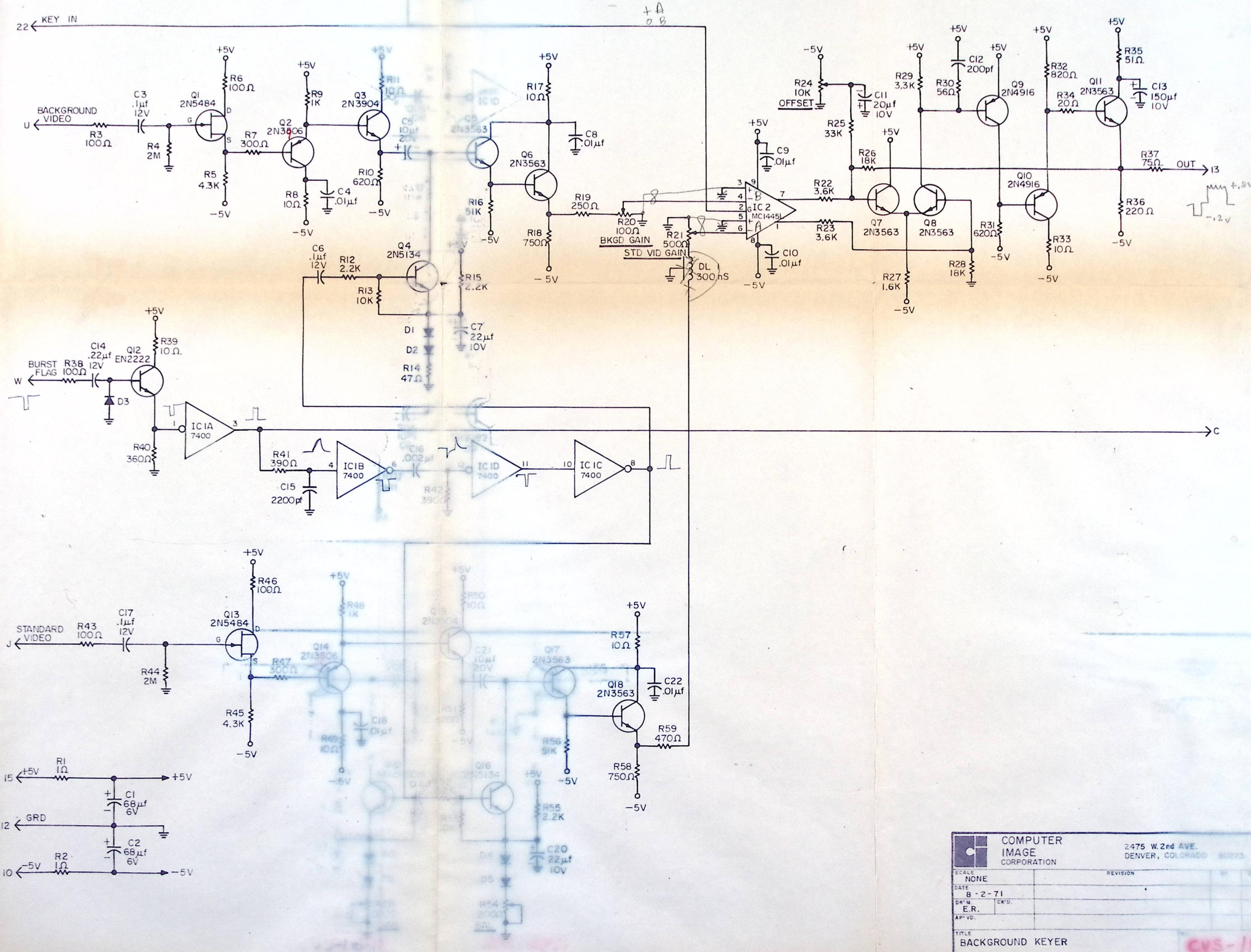
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd. AVE
DENVER, COLORADO 80223.

	REVISION	BY	DATE
SCALE NONE			
DATE 3-11-71			
DR'N E.R. CK'D			
AP'VD.			

TITLE COLOR CONTROLS
COLOR CONTROLLER

NO. CVS-106B

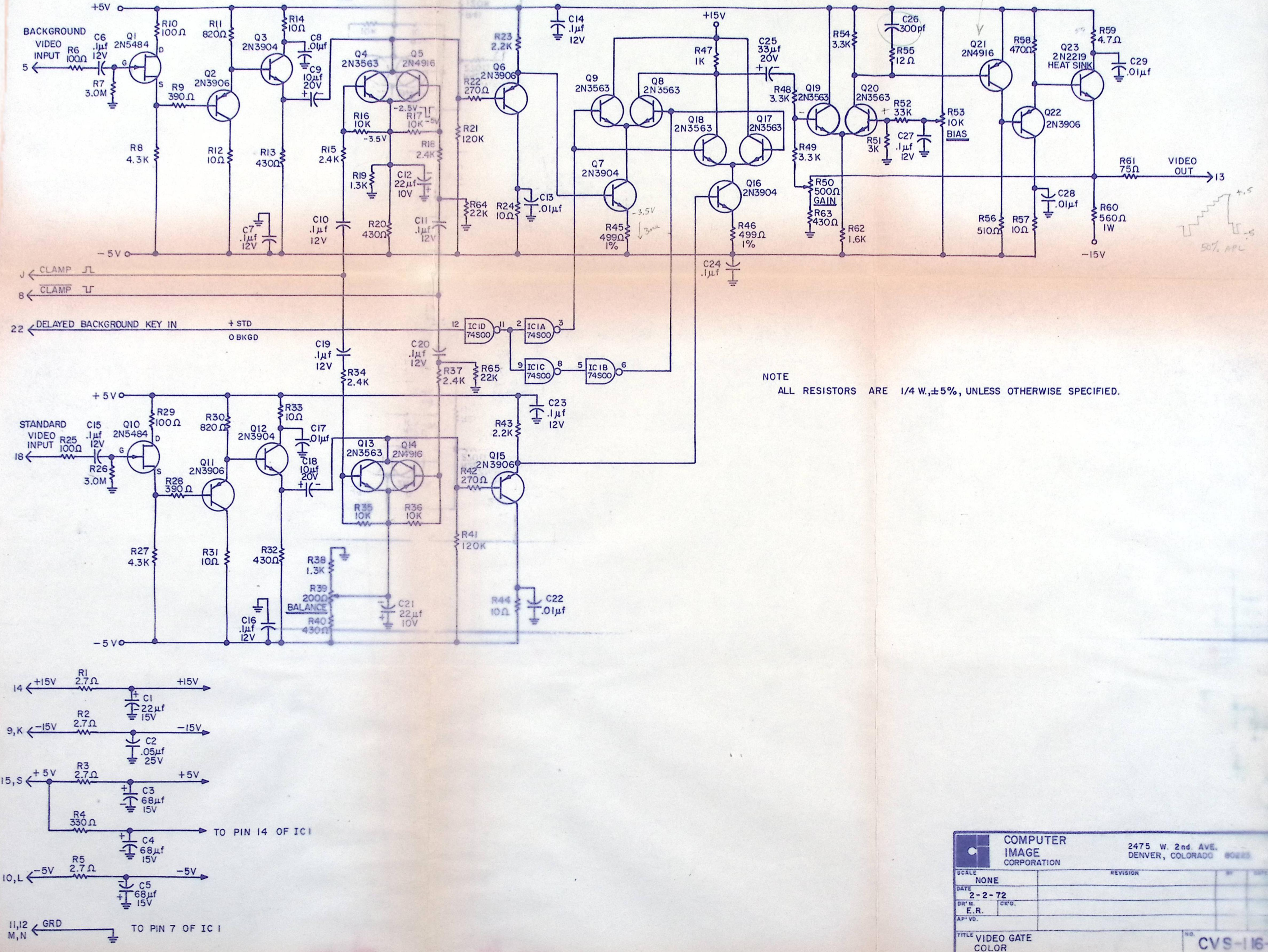


COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE NONE
REVISION
DATE 8-2-71
DR'N E.R.
CK'D.
APP'VD.
TITLE BACKGROUND KEYER

CVS-116



May need to select if oscillation

NOTE
ALL RESISTORS ARE 1/4 W., ±5%, UNLESS OTHERWISE SPECIFIED.

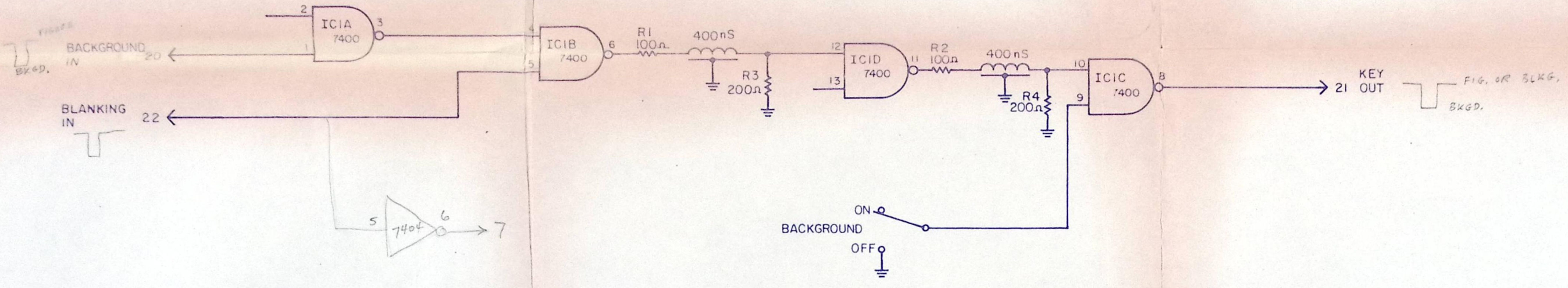
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 2-2-72			
DR'N. E.R.	CK'D.		
AP'VD.			

TITLE VIDEO GATE
COLOR

NO. CVS-116-1



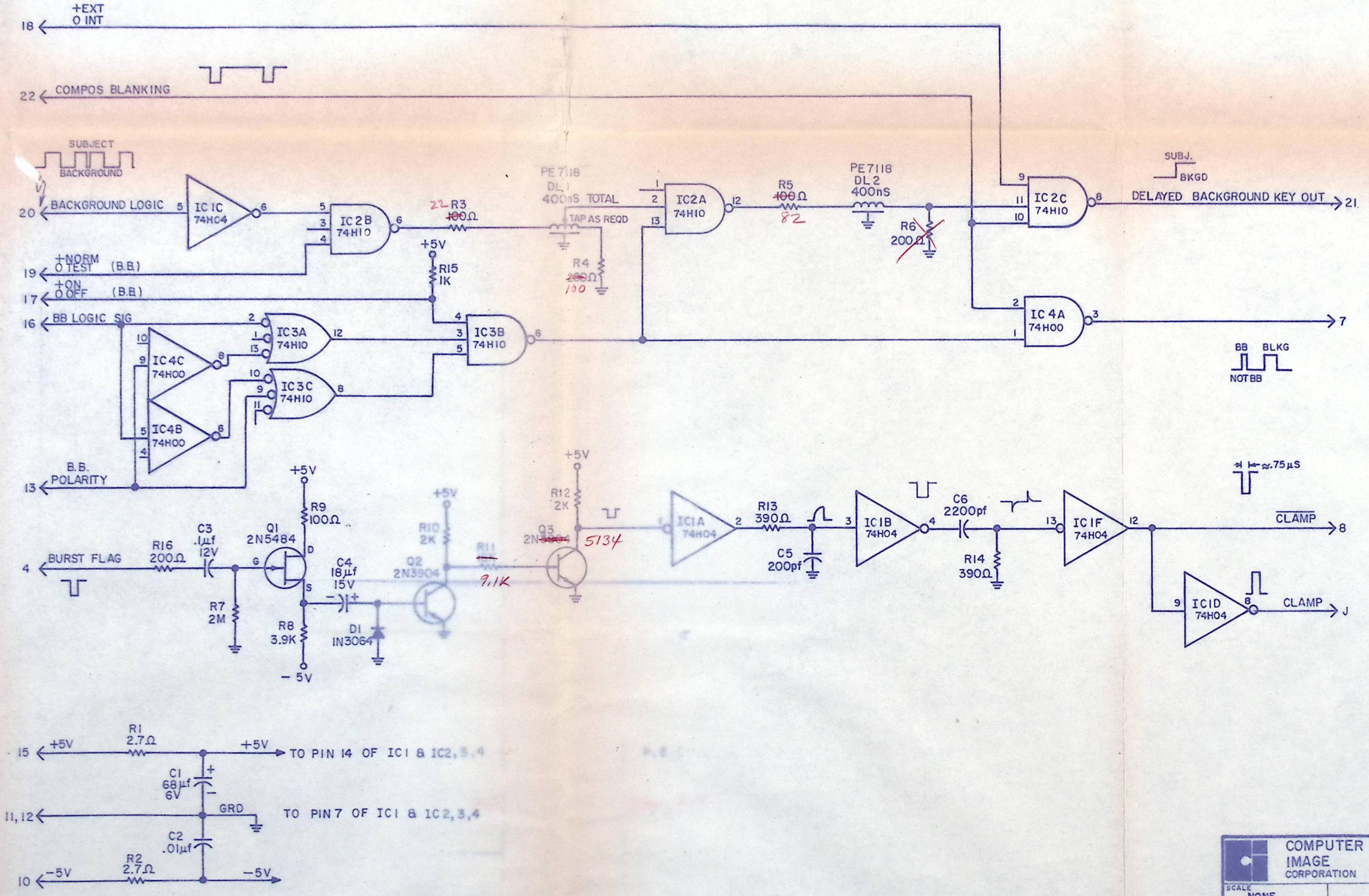
COMPUTER IMAGE CORPORATION

2475 W. 2ND. AVE.,
DENVER, COLORADO 80223

SCALE
REVISION
BY
DATE
DATE
DR'N.
CK'D.
AP'VD.

TITLE
BACKGROUND KEY DELAY

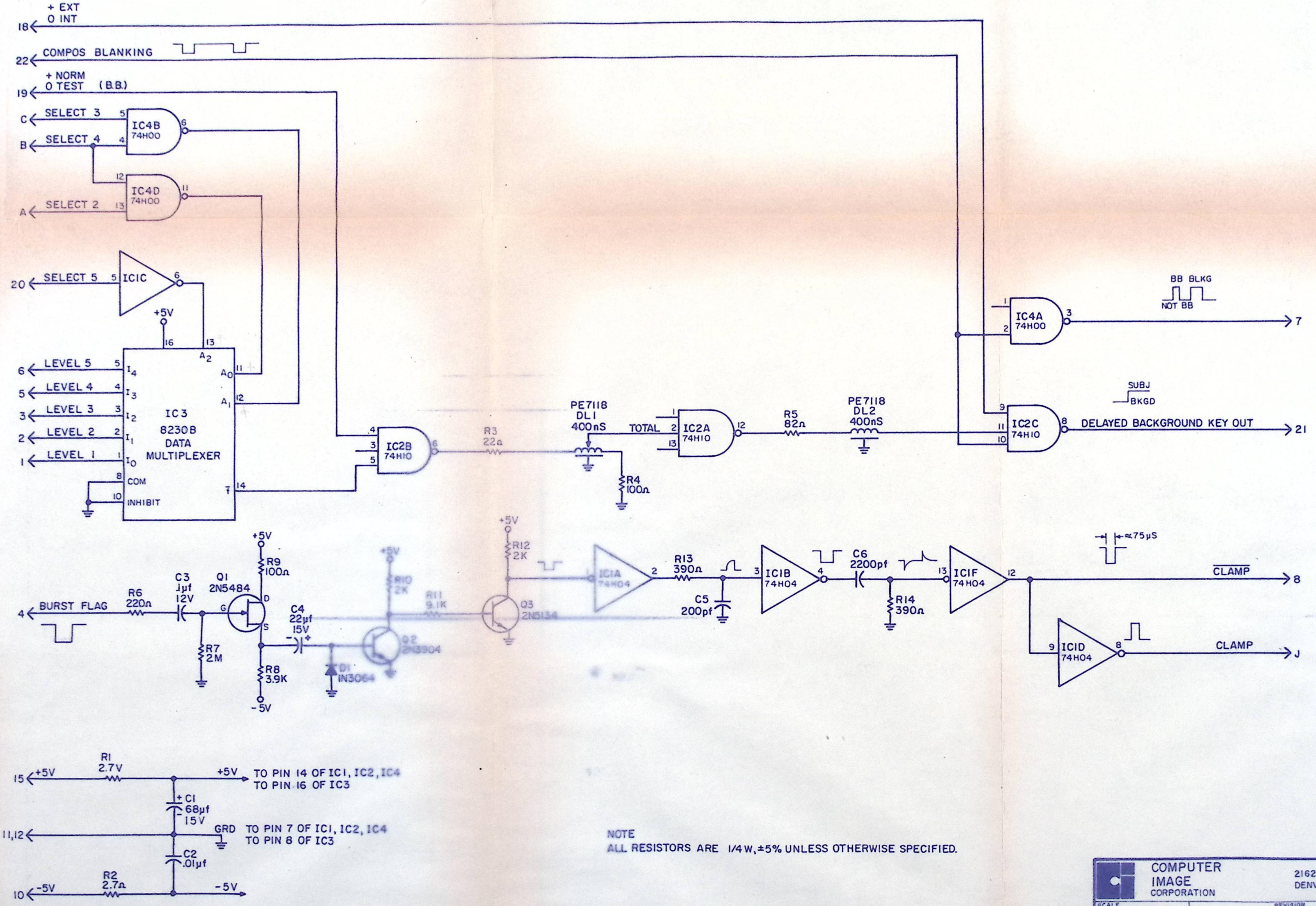
NO. [illegible]



COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE	NONE
DATE	2-2-72
DR'N.	E.R.
CK'D.	
AP'VD.	
REVISION	
BY	
DATE	
TITLE	BACK GROUND KEY DELAY
NO.	CVS-117-1



NOTE
ALL RESISTORS ARE 1/4 W, ±5% UNLESS OTHERWISE SPECIFIED.

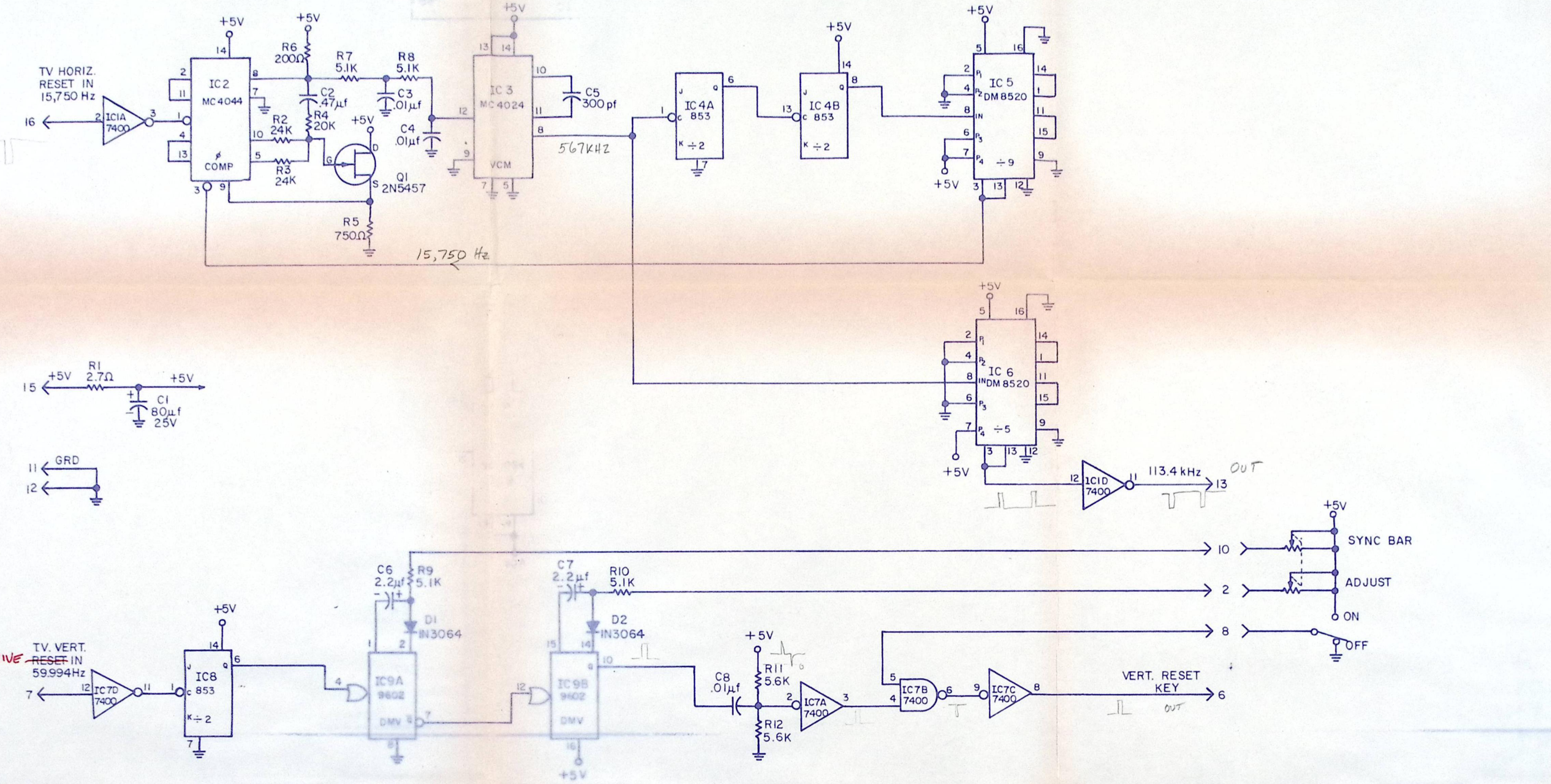
COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE NONE		REVISION
DATE 9-23-72		
DR'N. MACK	CK'D.	
AP'VD.		

TITLE BACKGROUND KEY DELAY
COLOR CONTROLLER

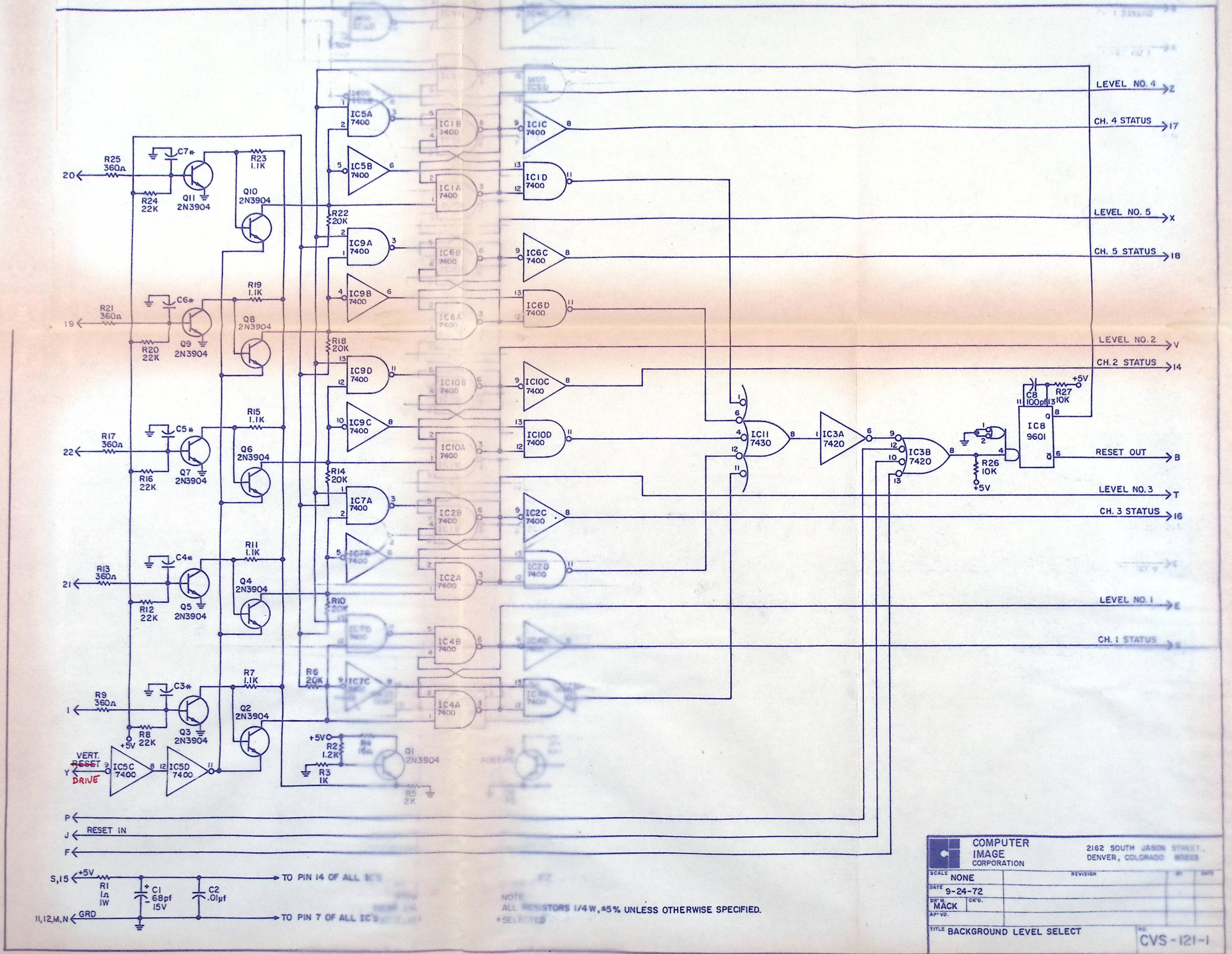
NO. CVS-117-2



COMPUTER IMAGE CORPORATION

2475 W. 2nd. AVE.
DENVER, COLORADO 80223

SCALE	NONE
REVISION	
BY	
DATE	
DATE	2-28-72
DR'N	E.R.
CK'D.	
AP'VD.	
TITLE	SYNC LOCK
NO.	CVS-120



NOTE
ALL RESISTORS 1/4 W, ±5% UNLESS OTHERWISE SPECIFIED.
*SELECTED

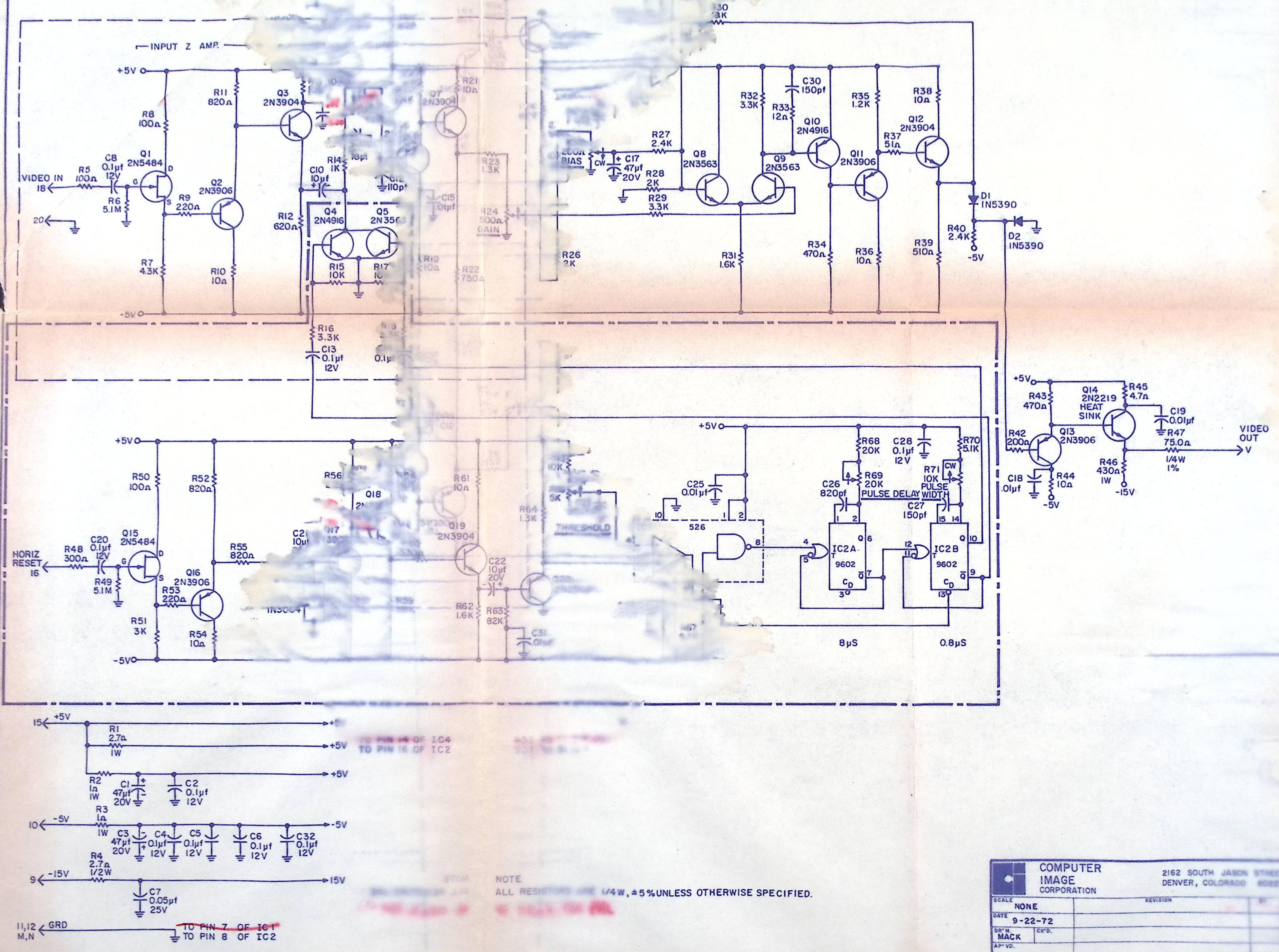
COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 9-24-72			
DR'N. MACK / CK'D.			
AP'VD.			

TITLE BACKGROUND LEVEL SELECT

NO. CVS-121-1

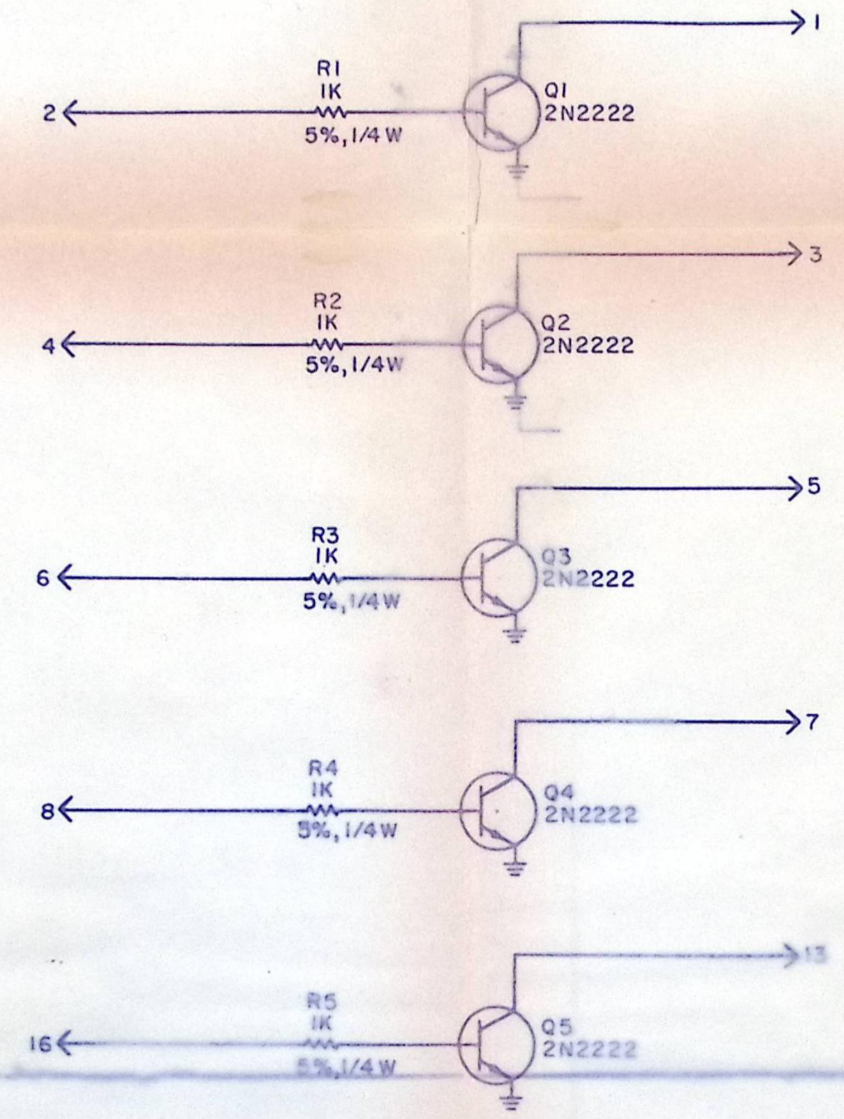


NOTE
ALL RESISTORS ARE 1/4W, ±5% UNLESS OTHERWISE SPECIFIED.

COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

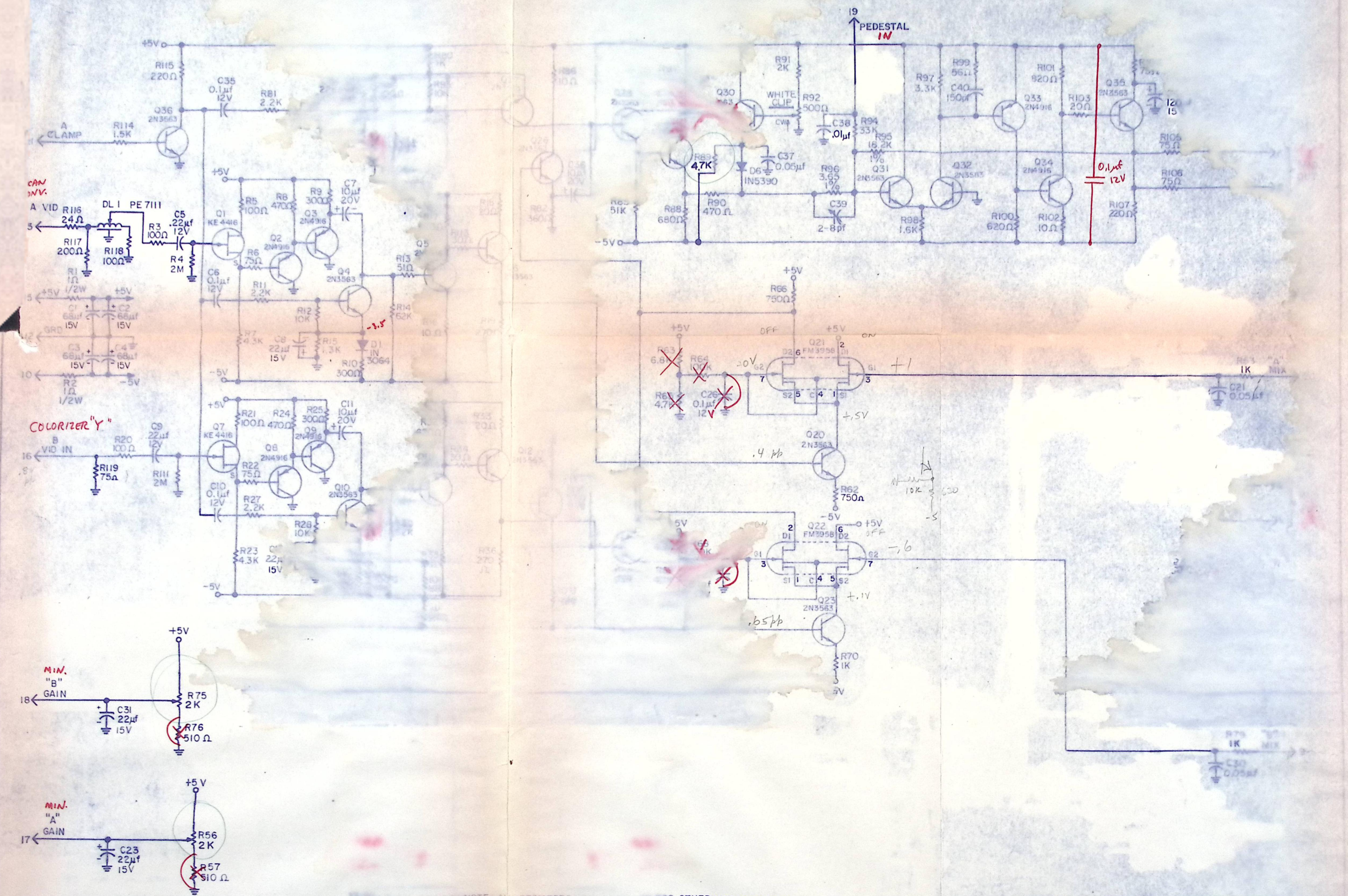
SCALE	NONE
DATE	9-22-72
DR'N.	MACK
CH'D.	
AP'VD.	
REVISION	
TITLE	3.58 FILTER
NO.	CVS-122



COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE NONE
DATE 9-25-72
DR'N. MACK
CK'D.
AP'VD.
REVISION
TITLE LAMP DRIVER
NO. CVS-126



NOTE: ALL RESISTORS ±5% 1/4 W UNLESS OTHERWISE SPECIFIED.

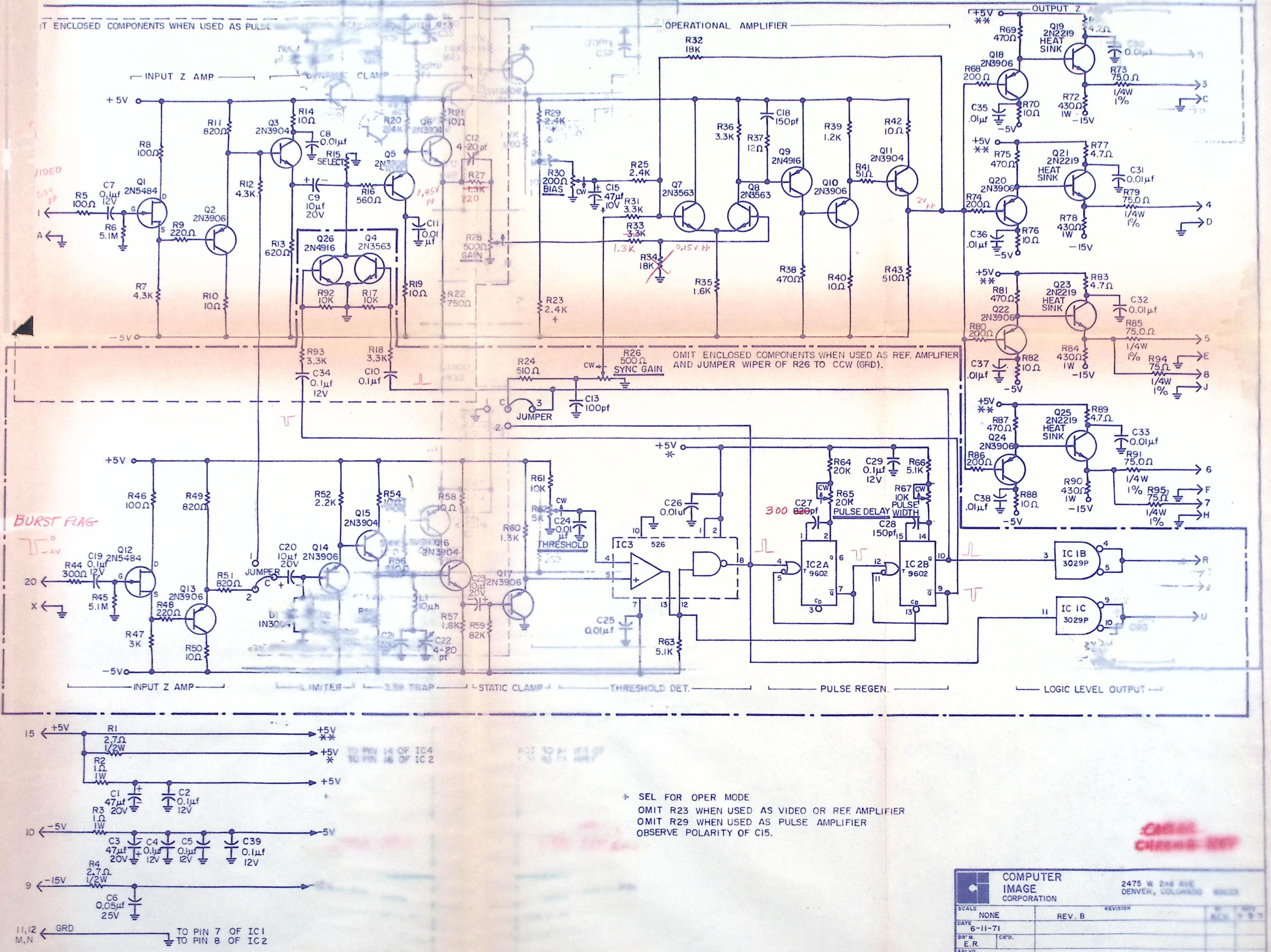
COMPUTER
IMAGE
CORPORATION

2475 W. 2ND AVE
DENVER, COLORADO

SCALE NONE
DATE 11-29-71
DR'N E.R

TITLE MIX - EFF AMPLIFIER
COLOR CONTROLLER

VS-103-1



+ SEL FOR OPER MODE

OMIT R23 WHEN USED AS VIDEO OR REF AMPLIFIER

OMIT R29 WHEN USED AS PULSE AMPLIFIER

OBSERVE POLARITY OF C15.

[illegible]

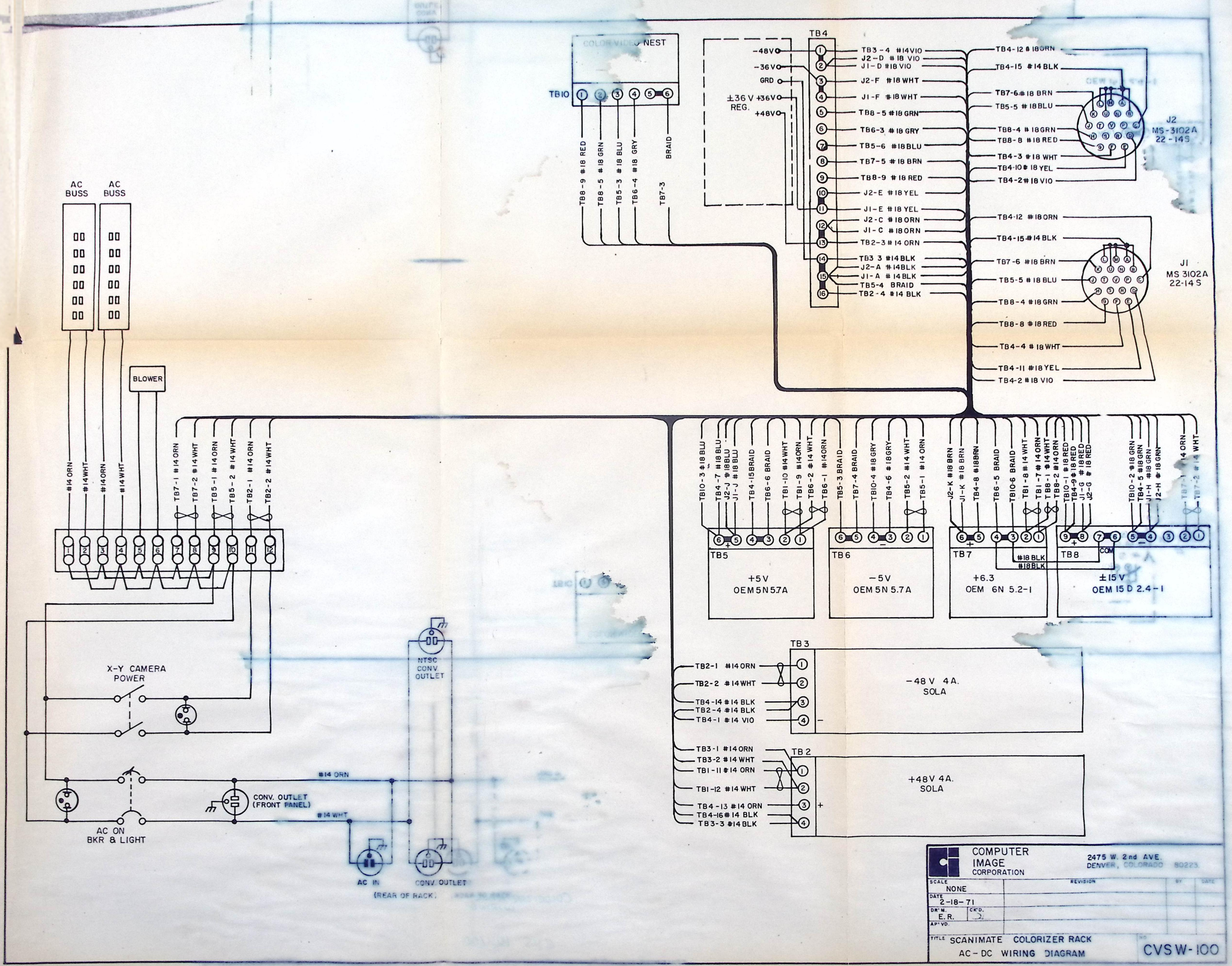
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE
DENVER, COLORADO 80223

SCALE NONE	REVISION REV. B	BY RCH	DATE 9-9-71
DATE 6-11-71			
DR'N. E.R. / CK'D.			
AP'VD.			

TITLE VIDEO/PULSE DISTRIBUTION AMPLIFIER

NO. VS-105B



COMPUTER IMAGE CORPORATION

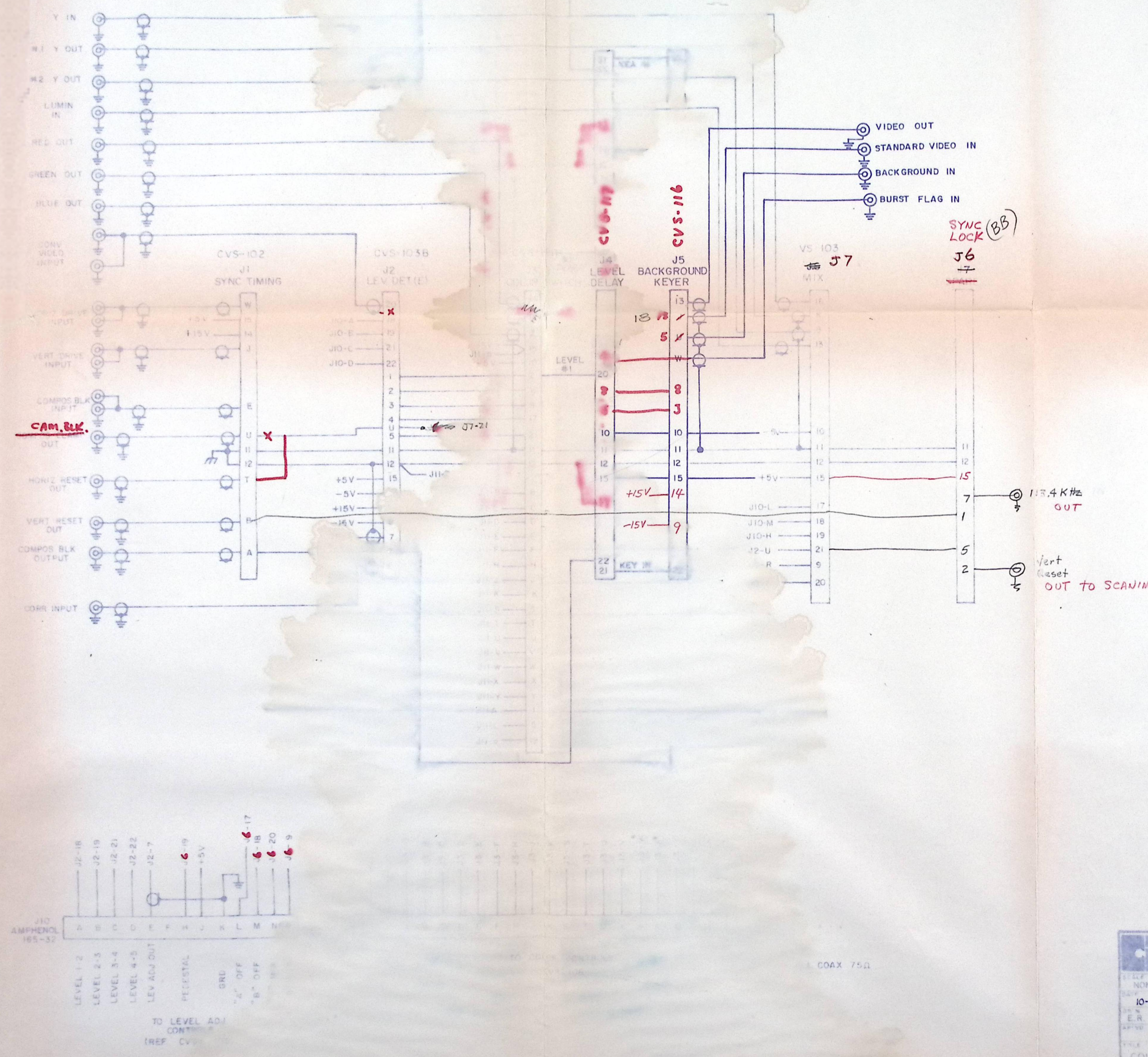
2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE	NONE
DATE	2-18-71
DR'N.	E.R.
CK'D.	
AP'VD.	

REVISION | BY | DATE

TITLE SCANIMATE COLORIZER RACK
AC-DC WIRING DIAGRAM

NO. CVSW-100



COMPUTER
IMAGE
CORPORATION

SCALE NONE

DATE 10-5-71

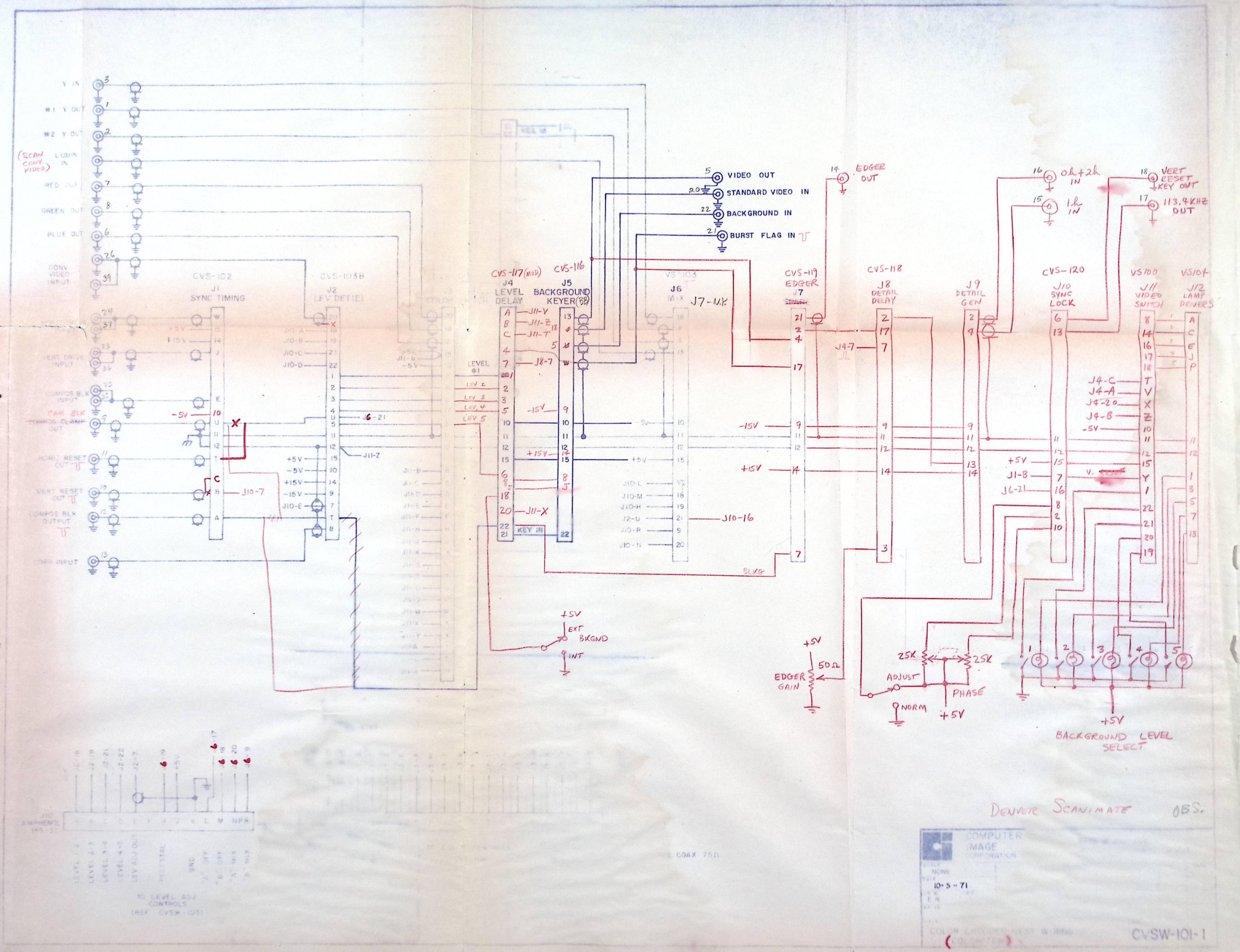
DR'N E.R

CK'D

APP'VD

TITLE COLOR EN[illegible] BASIC WIRING
COLOR[illegible]

CVSW-101-1



DENVER SCANIMATE OBS.

COMPUTER IMAGE CORPORATION

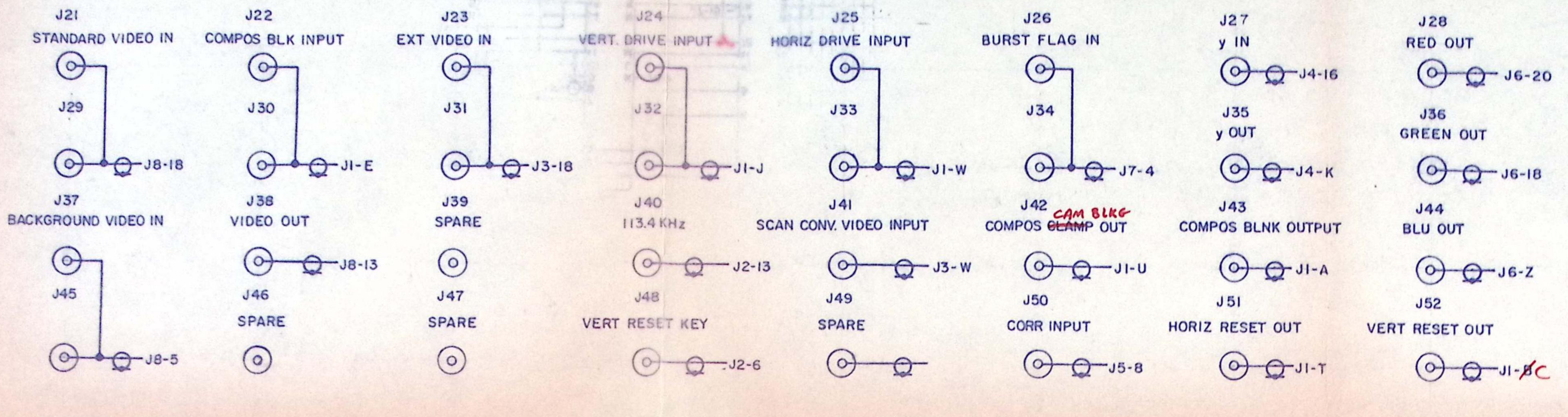
SCALE NONE

DATE 10-5-71

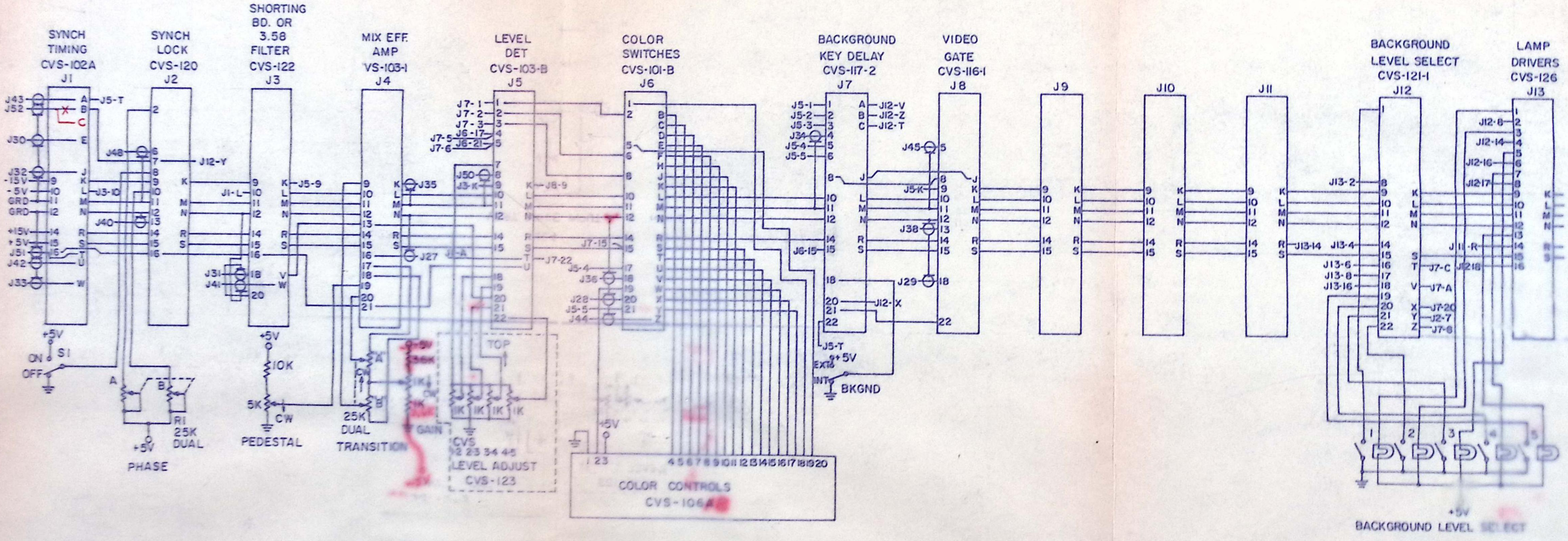
DRN E.R.

COLOR CHASSIS NEST WIRING (COLORIZER)

CVSW-101-1



REAR PANEL



OBS.

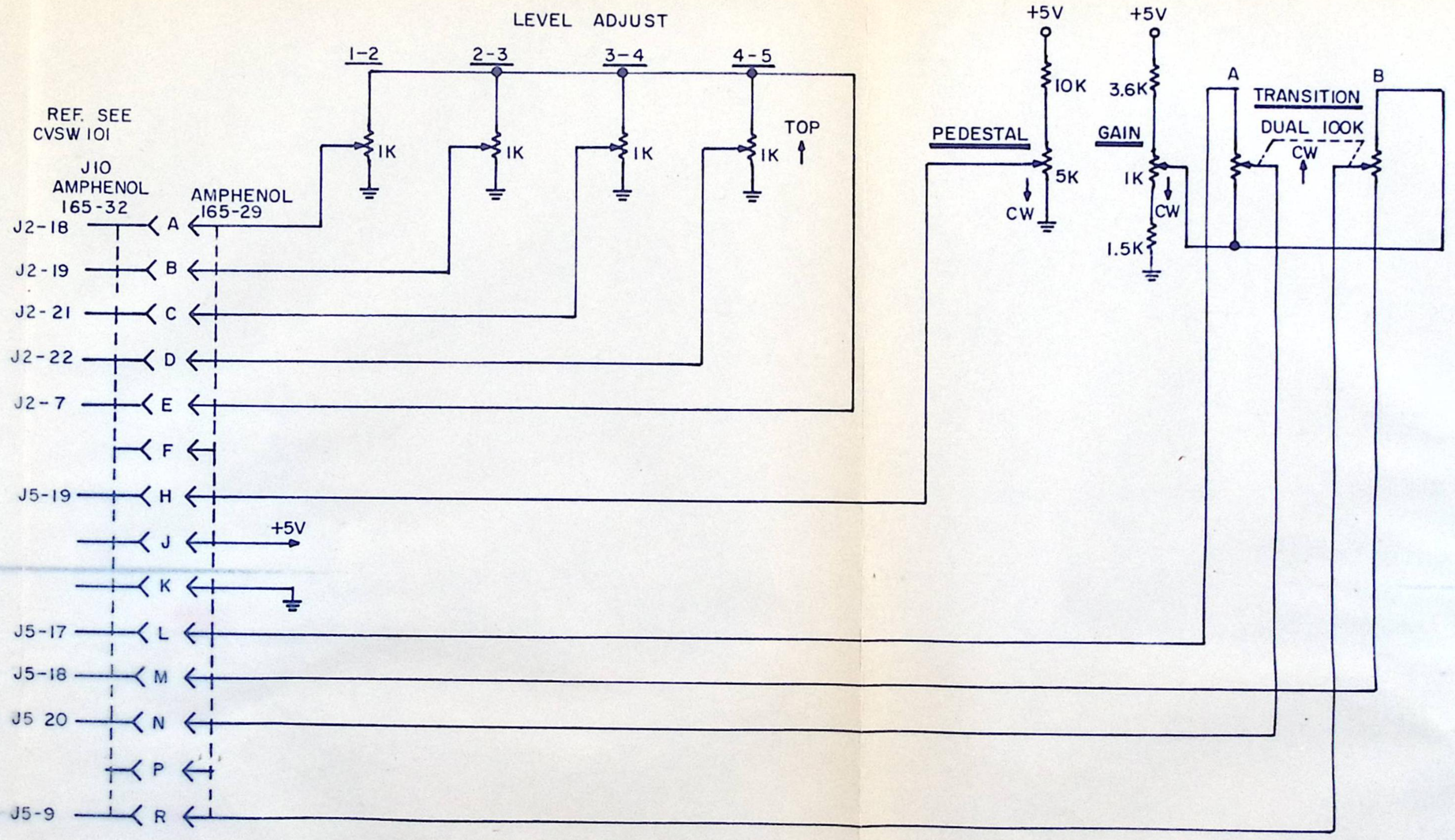
COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE None	REVISION	BY	DATE
DATE 10-21-77			
DR'N Mack / CK'D.			
AP'VD.			

TITLE WIRING DIAGRAM
COLOR CONTROLLER

NO. CVSW-101-3



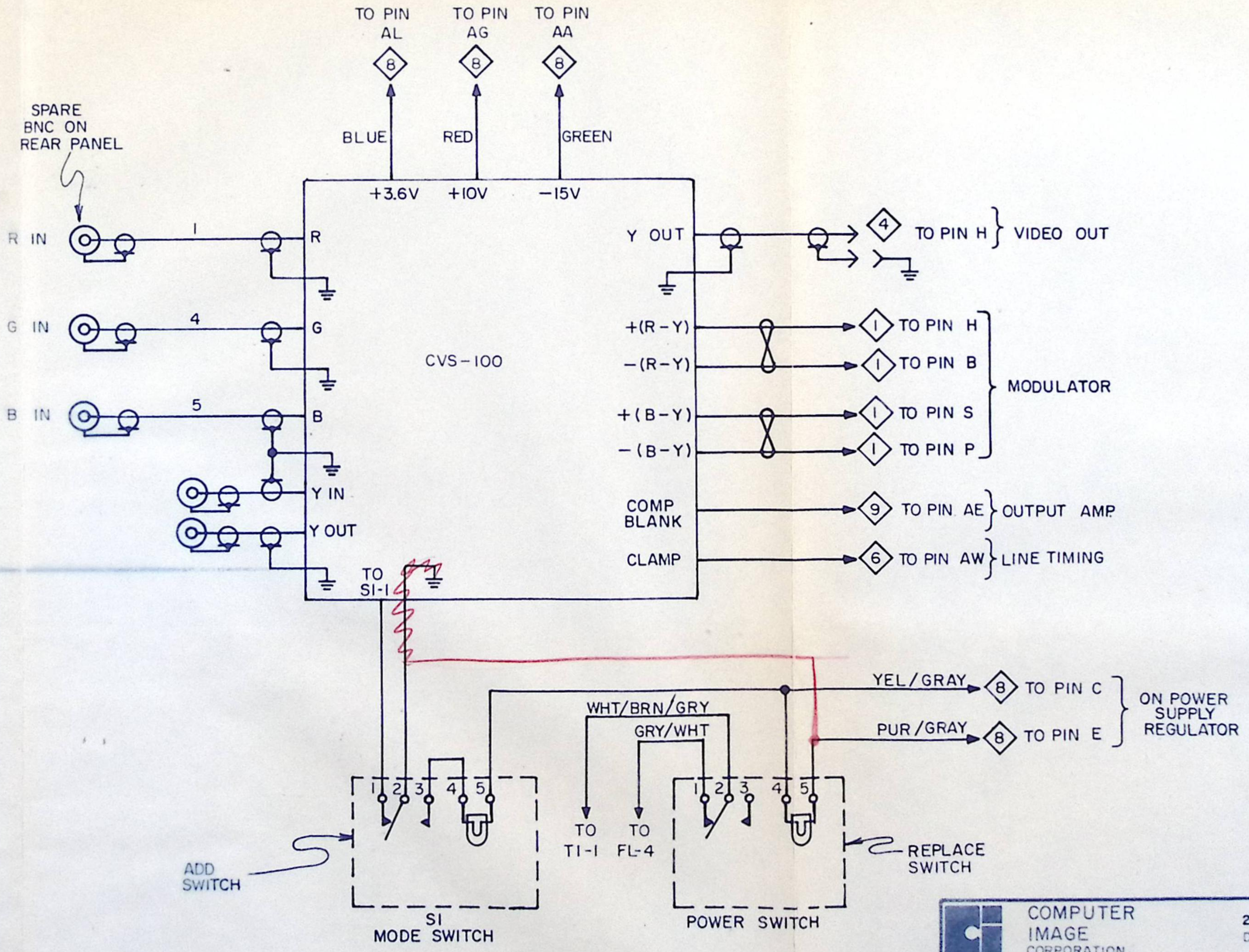
COMPUTER
IMAGE
CORPORATION

2475 W. 2 nd. AVE.
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 4-19-71			
DR'N.	CK'D		
AP'VD.			

TITLE LEVEL ADJUST FRONT PANEL WIRING
(COLORIZER)

NO. CVSW-103

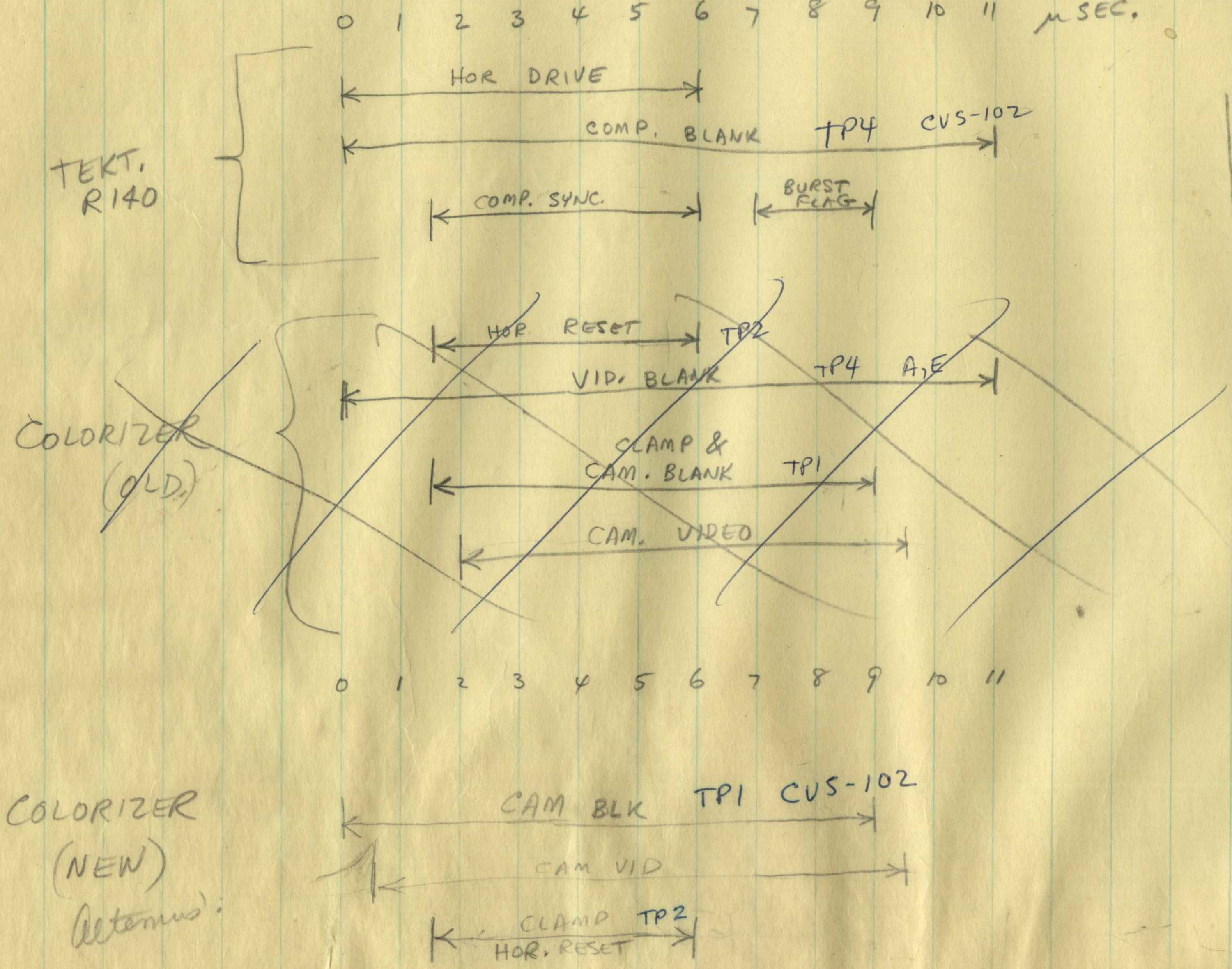


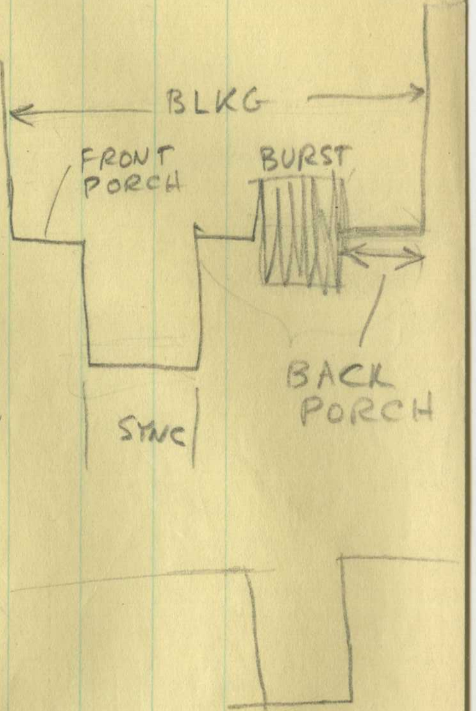
NOTE:
SPLICE SPARE POWER SWITCH WIRES TOGETHER (F2 TO T1-4)

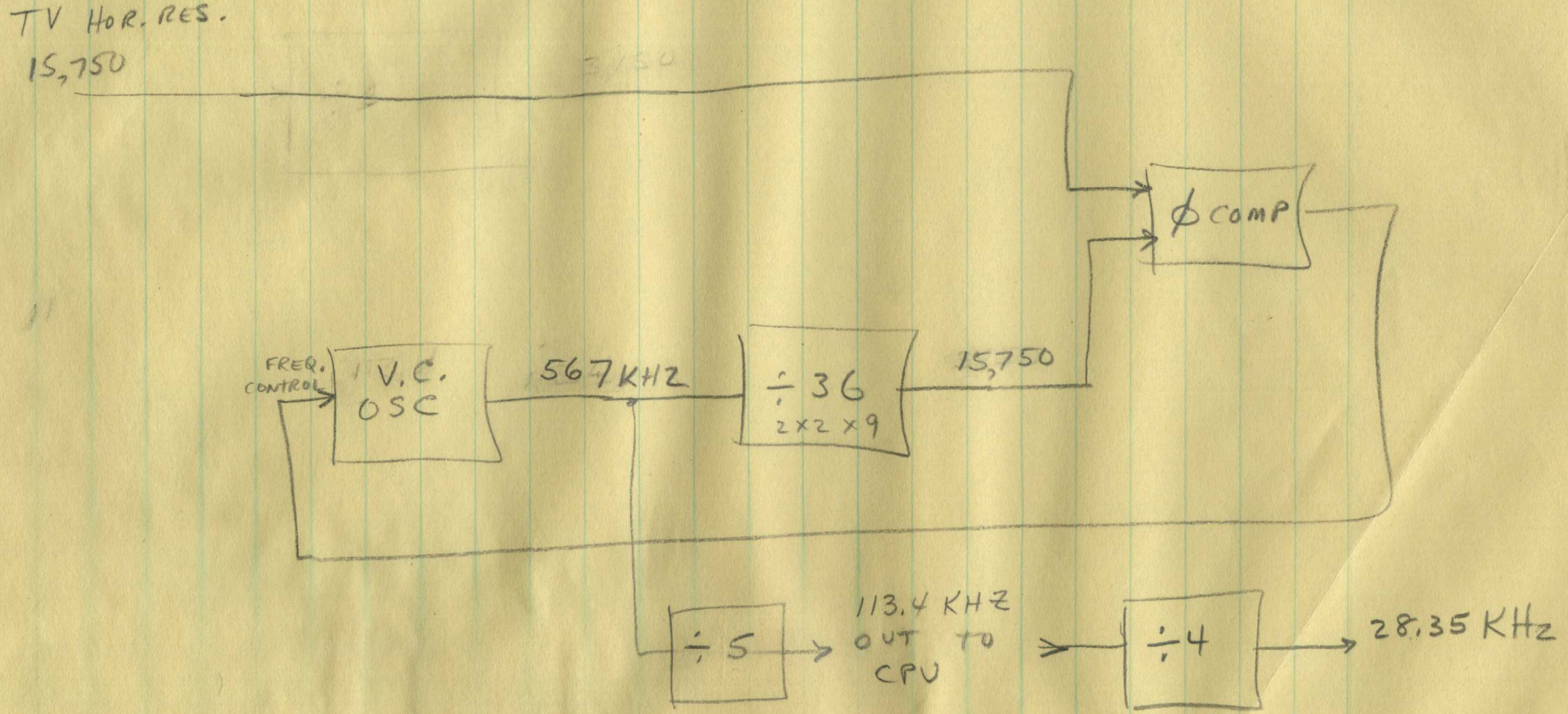
T1-4 BLK/YEL/GRY
F2 BLK/BRN/GRY

COMPUTER IMAGE CORPORATION	2475 W. 2nd. AVE. DENVER, COLORADO 80223		
SCALE NONE	REVISION	BY	DATE
DATE 4-21-71			
DR'N E.R. CK'D			
APP'VD			
TITLE TEKTRONIX 140 NTSC SIGNAL GEN. MODIFICATION WIRING DIAGRAM		NO. CVSW-104	

TV HORIZONTAL TIMING
SCAN CONVERTER + COLORIZER







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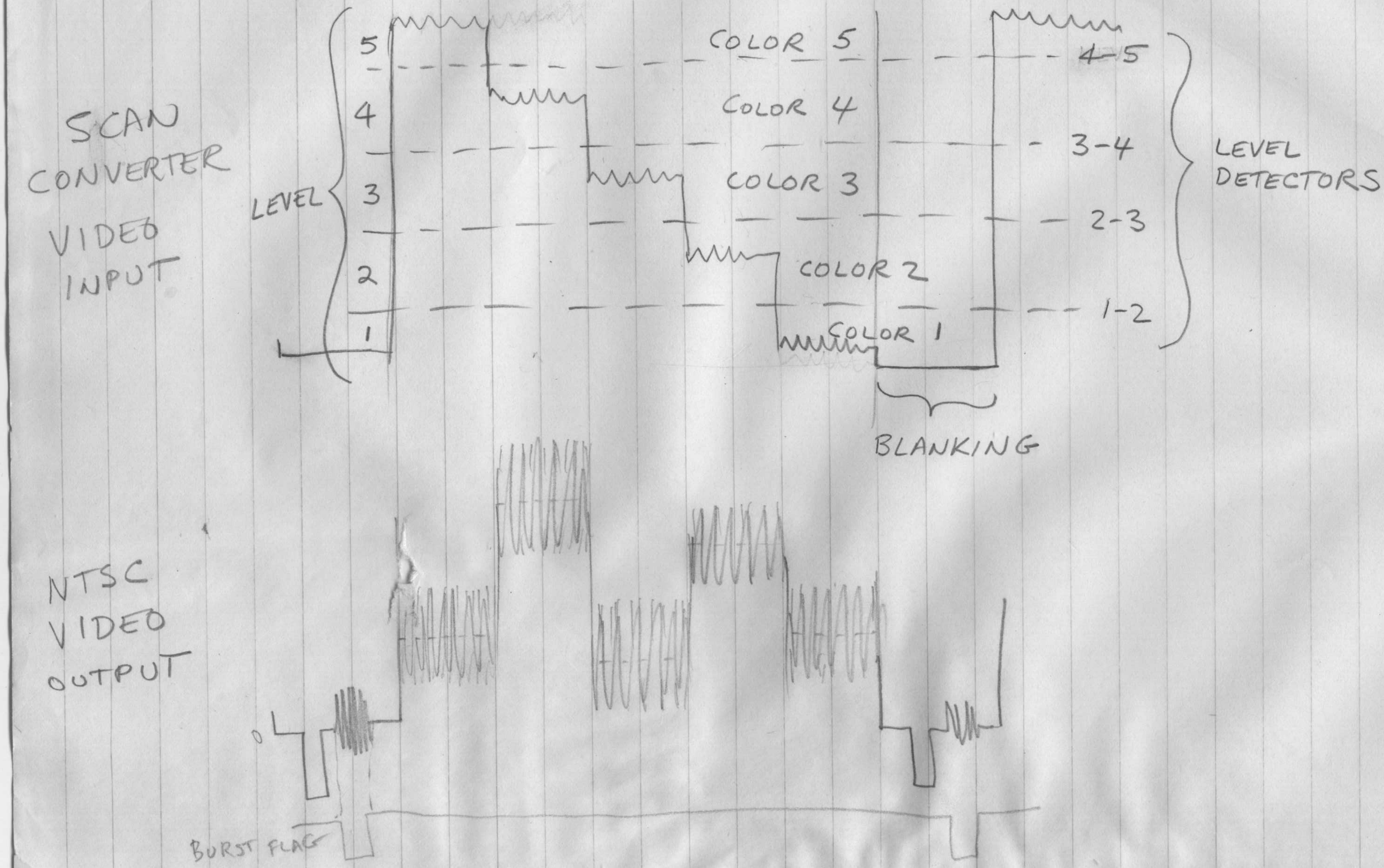
      1575
36 ) 56700
     36
     207
     180
      270
      252
       180
```

SYNC LOCK
CVS-120

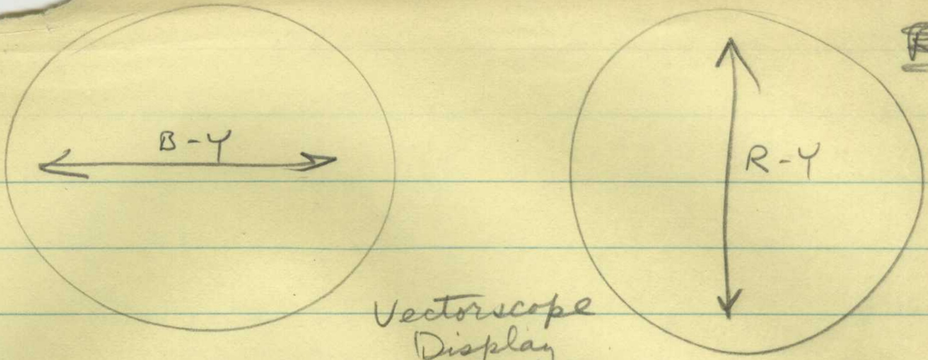


SCAN CONVERTER VIDEO INPUT
LEVEL
5
4
3
2
1
COLOR 5
COLOR 4
COLOR 3
COLOR 2
COLOR 1
4-5
3-4
2-3
1-2
LEVEL DETECTORS
BLANKING
NTSC VIDEO OUTPUT
0
BURST FLAG

Color Matrix
CVS-100

~~B-Y~~

~~R-Y~~



Vectorscope Display

B-Y Level - Adjust for linear operation of Q31 and Q32. Emitters should be + 1.2V (B+W

B-Y Gain - gain - right side moves more than left side

B-Y Balance - moves position of all together

R-Y Level - Adjust for linear operation of Q21 + Q22 Emitters should be +1.2V for B+W

R-Y Gain

R-Y Balance

Colorizer Video Mix (VS-103) Delay

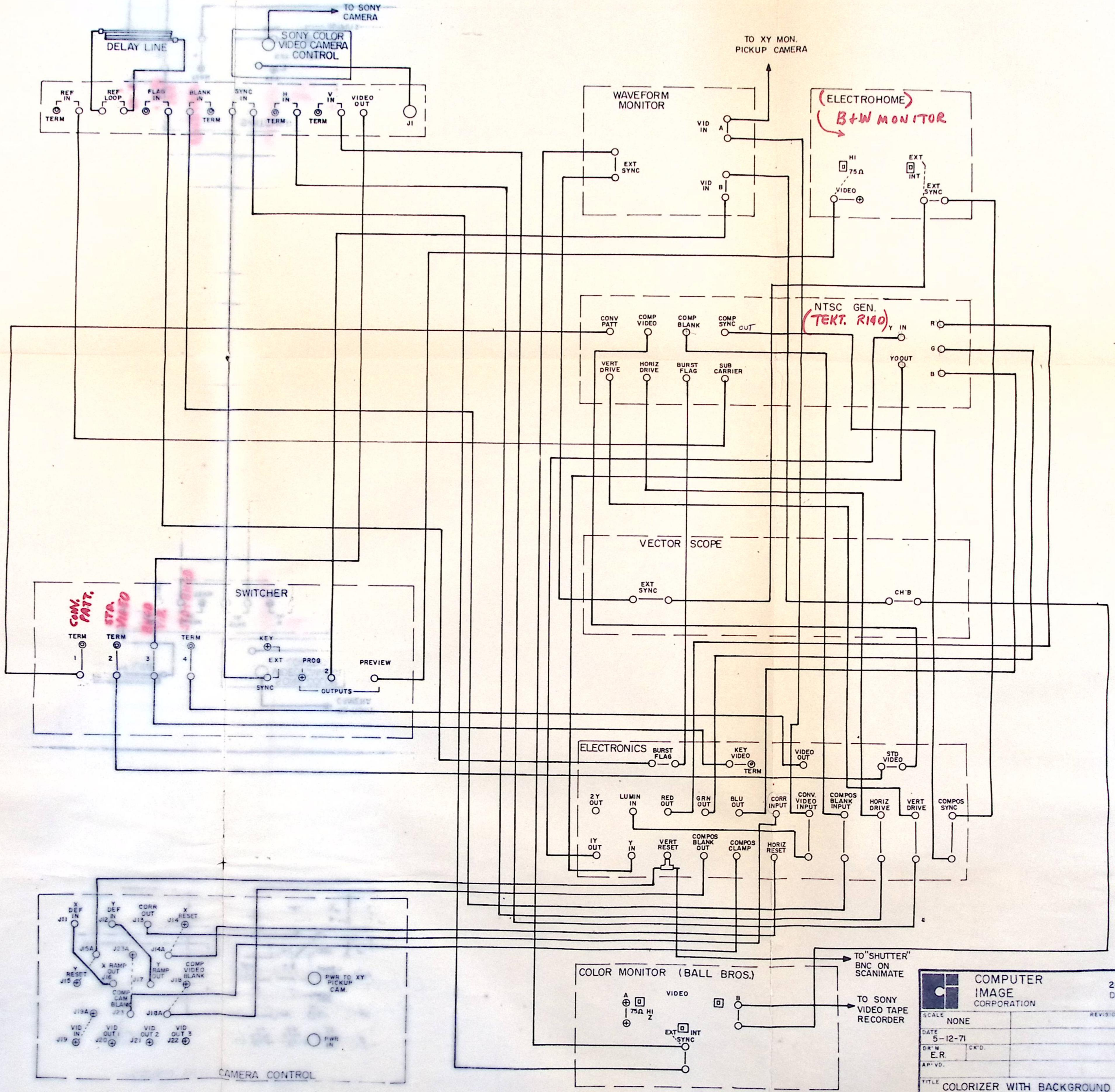
(Mix-Effect Amp. board)

Set background (level #1) to white.

Set Level #2, 3, 4, 5 to black.

Turn Mix full Clockwise
Set Level Det 2-3, 3-4, 4-5 to max. up.
Adjust Level Det 1-2 to detect a black to white to black transitions (Use a wide vertical bar)
Adjust Mix for uniform gray on the above transitions.

Vary delay tap for same edge effect at both left and right edges.



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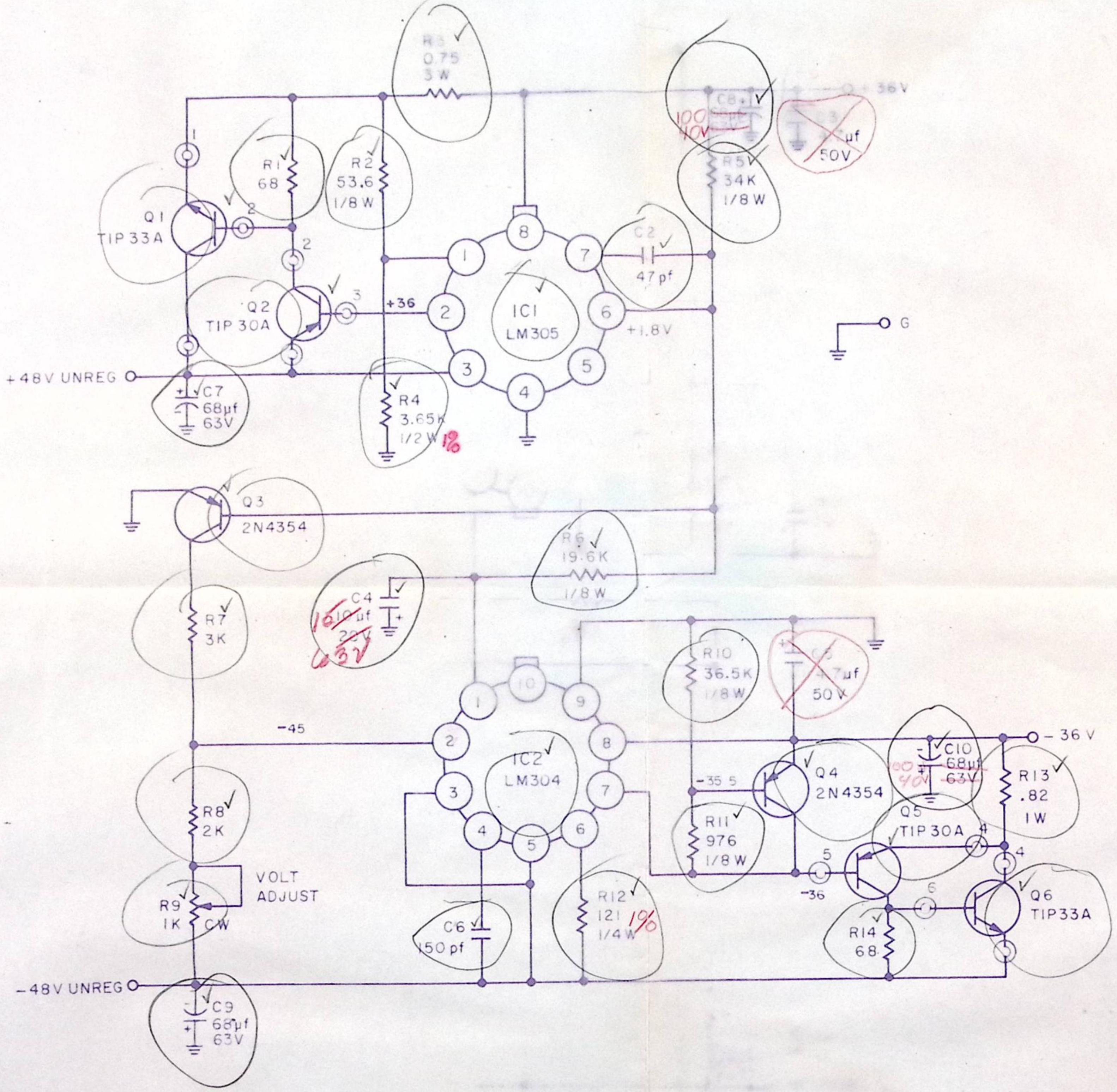
AP'VD.			

TITLE COLORIZER WITH BACKGROUND CABLING DIAGRAM

NO. CVSW-106



NOTE: Q1, Q2, Q5, Q6 MOUNTED ON DELTA NC-421K HEAT SINK

Resistors are 1/4 w Unless otherwise Indicated

COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

REVISION		BY	DATE
	REV	R.K.P.	7-6-73

TITLE: ± 36 VOLT REGULATOR

NO. SM-111A